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Electronic Benefit Transfer System Demonstrations
for the Food Stamp Program

United States
Department of
Agriculture

Food and
Nutrition
Service

Office of
Analysis and
Evaluation

Implementing an Electronic Benefit Transfer System for the Food Stamp Program: Information for State Agencies

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Electronic Benefit Transfer System Demonstrations for the Food Stamp Program

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Implementing an Electronic Benefit Transfer System for the Food Stamp Program: Information for State Agencies

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EXECUTIVE SUMMARY

For several years, the Food and Nutrition Service (FNS) of the United States Department of Agriculture has been investigating alternatives to the use of food stamp coupons as the medium for issuing and redeeming benefits under the Food Stamp Program. The goal of this search is to reduce the cost of issuing program benefits and the program's vulnerability to fraud and abuse.

One alternative is to use point-of-sale (POS) and electronic-funds-transfer (EFT) technologies to create an Electronic Benefit Transfer (EBT) system. FNS has sponsored a demonstration of two related EBT systems in Reading, Pennsylvania. Despite the high cost of operating the first EBT system, the positive response to this demonstration and the widespread interest in EBT systems have led FNS to continue this line of research by sponsoring four State-initiated EBT demonstrations. FNS has also issued guidelines under which States may conduct unsolicited EBT demonstrations.

This report offers information for State Agencies that are considering a demonstration of an on-line EBT system under the FNS guidelines. It discusses the many tasks that must be completed during the design, development, testing, and implementation of an EBT system, drawing on the experience provided by the Reading demonstration. The report focuses on the decisions that a State will have to make and the actions that must be taken to bring an EBT system from initial design to live operations. A major theme is how a State's decisions may affect required staff resources, development costs, and system operating characteristics.

THE READING EBT DEMONSTRATION

In July 1983, FNS awarded a contract to a systems engineering firm, Planning Research Corporation (PRC), to design, develop, and implement an EBT system in Reading, Pennsylvania. That system operated from October 1984 through December 1985, involving all food stamp recipients in the central portion of Reading and nearly all program-authorized food retailers within a five-mile radius of downtown Reading.

Nearly all demonstration participants (recipients, retailers, financial institutions, and State and local welfare office staff) preferred the EBT

system to the coupon-based issuance system it replaced. Responding to this support, the Pennsylvania Department of Public Welfare (PDPW) asked FNS to extend the demonstration. FNS agreed to an extension if PDPW assumed operating responsibilities for the system and improved some of the system's technical limitations. PDPW also agreed to pay 100 percent of demonstration costs above a specified limit. Following this agreement, PDPW operated the original EBT system until June 1987, at which time it implemented a redesigned system that operates on the State's own computer facilities.

Both EBT systems tested during the Reading demonstration represent on-line, debit card systems which operate similarly to point-of-sale systems offered by commercial financial networks. Each food stamp household's monthly benefit allotment is recorded in an account on the system's computer. The primary recipient in the household is issued a magnetically encoded benefit card, which is used together with a personal identification number (PIN) for identification at the point of sale. Each participating retailer is provided with one or more POS terminals and a telephone link to the EBT computer. The recipient redeems his or her benefits at the point of sale by initiating an on-line electronic transaction that results in an immediate debit to his or her account and a simultaneous credit to the retailer's EBT system account. Retailers' EBT credits are totalled each business day and posted to their bank accounts through electronic funds transfers.

ALTERNATIVE MODELS FOR AN EBT SYSTEM

A key dimension that characterizes an EBT system is the extent to which it shares central processing facilities, POS terminals, and other resources with other assistance programs or commercial POS applications. There are several possible models of resource sharing for an on-line EBT system. The PRC system was an independent EBT system, in which all system components, including the central computers and the terminal network, were used exclusively for processing EBT transactions. Any EBT system in which central processing facilities are shared with other applications is an integrated EBT system. PDPW's redesigned system is an integrated EBT food stamp-only system, in which the terminal network is dedicated to the Food Stamp Program but the central computers are shared with other data processing applications to achieve economies of scale. Another approach to resource

sharing is the multi-program EBT system, in which other assistance programs (such as Aid to Families with Dependent Children) use the same computers, cards, and terminals to deliver benefits. Finally, an EBT system could combine resources with a commercial financial network, forming an integrated EBT/POS system. In such a system, the POS terminals would serve both food stamp recipients and users of commercial payment systems, such as check verification, credit draft capture, or debit cards. Processing responsibilities in an integrated EBT/POS system would be divided between the State Agency and the financial network.

This report discusses the tasks to be performed in implementing an integrated EBT system and alternative approaches a State Agency could select to complete these tasks. The focus is on the tasks and issues involved in implementing an integrated food stamp-only EBT system, such as the PDPW system. Many of these tasks and issues, however, have equal relevance to the other on-line EBT system models, including the multi-program and EBT/POS models. Thus, States considering any type of integrated on-line EBT system can incorporate much of the report's material into their own decision-making and planning.

MAJOR ACTIVITIES LEADING TO THE ESTABLISHMENT OF AN EBT SYSTEM

Regardless of which EBT system model is selected, a State Agency will need to manage four distinct stages of preparing an EBT system. The process begins with system design. After the design is established, a prototype of the system needs to be developed. The system then needs to be tested. Finally, a series of implementation tasks lead to system start-up and initial operations.

Each stage of the process involves a number of subsidiary steps, which are summarized below. Throughout the process, the State needs to monitor progress relative to schedules, maintain coordination among task groups, and, if necessary, resolve disputes. Top managers within the State Agency should be kept informed and available to make key decisions; commit necessary resources; and maintain cooperation among the system's developers, those who will operate it, and the eventual system users. The role that the State plays (and its effectiveness in that role) will affect its capability to oversee or operate the EBT system and its credibility with program participants.

SYSTEM DESIGN ACTIVITIES

The design stage is a critical phase in the process of establishing an EBT system. The system design will determine what program functions the system will perform and, to a large degree, how well it will function. The process involves five sequential steps: assembling an EBT project team, choosing a specific system model, defining the system's functional and performance requirements, preparing a detailed system design, and reviewing that plan.

When designing an EBT system, a State may choose to assume all design responsibilities or it may contract with an outside firm for the design effort. Contracting out offers access to scarce expertise and the promise of greater speed and efficiency, but reduces the State's control over the process and its costs. If a contractor is selected, the State might decide to work closely with the contractor throughout the design process. Alternatively, the State could provide the contractor with general specifications for system functions and performance, and then let the contractor prepare the detailed system design. Even this latter approach, however, will require State involvement in the design process, because State staff will have to assist the contractor with those aspects of system design which interact with existing State program operations (e.g., benefit issuance) and evaluate the contractor's products.

Regardless of the extent to which State staff will be involved in preparing the system design, a State needs to assemble an EBT project team that will oversee all system design, development, testing, and implementation activities. The team needs to include senior program and technical staff with extensive knowledge of Food Stamp Program requirements, State and local program operations, and existing State computer systems. These staff need to develop a familiarity with available POS and EFT technologies, with industry standards for system design and operations, and with federal and State laws and regulations that may affect EBT system implementation. If the State plans to work with a contractor during the design process or to design the system itself, the project team will need a higher level of POS expertise than if a contractor designs the system.

The EBT project team then needs to specify the general features of the design. They must choose a specific system model from the array of possible on-line system models. An integrated EBT system could be a food stamp-only system (such as the PDPW system), a multi-program system, or an EBT/POS system. A food stamp-only system is likely to be simpler and cheaper to implement, but a multi-program system could save money in the long run by spreading fixed costs over more users. An EBT/POS system involves an even more complex implementation process with non-governmental actors playing larger roles.

Along with the basic system model, the State must choose whether the EBT system will operate on the State's own computers or a vendor's system. The project team also should decide what geographic areas will be included in the EBT system, both for pilot-level implementation and in the long run, after the system has been approved for larger-scale operations. Performance standards and requirements for integration with State systems should be considered, at least in general terms.

The design for an EBT system must define the system's functional requirements. In these requirements, the design specifies how the EBT system will perform the tasks necessary to accomplish five major functions:

- authorizing access to benefits;
- providing food benefits to recipients;
- crediting retailers and financial institutions for benefits redeemed;
- reconciling system accounts and flows of benefits through the system, and producing management reports; and
- managing retailer participation.

At this stage the project team can decide whether the EBT system will be similar to an existing design (such as the PDPW EBT system or a commercial POS system) or whether a more customized design is desired. Choosing an existing design offers the advantages of lower development costs and proven system reliability (because an existing software package can be modified and used), but some existing software may be difficult to adapt to the State's functional requirements and computer configuration. Creating a

more customized design will require more effort during software development and more detailed testing of the system before implementation.

The EBT system design should include other design requirements concerning system capacity, performance standards, and requirements for integration with program operations. An EBT system must have sufficient capacity to handle the expected peak loads and overall volume of activity for the pilot area, and it must be capable of expansion to accommodate the State's long range plans. Establishing clear expectations for the performance of the EBT system is critical to ensuring that the system will be satisfactory to all system users. EBT system performance is particularly important to food retailers, but banks, recipients, and program staff also need assurances in this area. The important dimensions of EBT system performance include reliability, response times, and ease of use. Interactions with program operations should be designed to fit smoothly into the existing workflow and meet any technical requirements for system interfaces.

Once the functional, performance, and user requirements for an EBT system have been determined, the system configuration needs to be specified. The general system design should identify the basic requirements for system hardware, telecommunications, and software. An integrated EBT system may require upgrading the State's computer system to improve performance or ensure compatibility with available POS software. Special EBT hardware requirements, including store terminals, printers, and balance inquiry devices must be identified. Finally, the project team needs to choose the type of telecommunications network which will link stores to the data center.

To ensure successful development and implementation of an EBT system, a detailed system design must be prepared. While the general system design may simply lay out functional, performance, and hardware requirements, the detailed design should state how each major and minor function will be performed and what specific equipment will be used. The detailed system design should be comprehensively documented. The design document should specify the functional and user requirements, roles of program participants, performance standards, and system configuration. A condensed, non-technical version of the design for retailers can be useful in promoting their understanding and support. Drafts of operations and user manuals (including quick reference guides) should be prepared, along with a detailed schedule for development, testing, and implementation.

The design review should be a comprehensive assessment of the logic and viability of the detailed design. All affected parties within and outside the State Agency (e.g., program and operations staff, financial institutions, FNS, and representatives from retailer trade associations and welfare advocacy groups) should have the opportunity to review and comment on pertinent sections of the design. The design review can be an ongoing process or a formal milestone, depending on the State's approach to system design and development.

SYSTEM DEVELOPMENT ACTIVITIES

As with system design, a State may choose to develop an EBT system using in-house resources, or it may contract with an outside firm for system development. If an outside firm is selected, the State could work as a co-developer with the contractor during development or follow a turn-key approach in which the contractor develops and implements the system, and then turns the system over to the State for on-going operations.

Turn-key development requires the least effort by State staff and, if the software is largely off-the-shelf, offers the lowest-cost approach to development. This approach, however, increases the need for effective contract negotiation and monitoring, and for complete, objective tests of the finished product. In addition, State technical staff still have to provide assistance to the developer in creating interfaces with existing program functions and in installation and testing of the software in the State's computer facilities.

A co-development effort with a contractor is likely to be more viable than an entirely in-house approach if the State wishes to be a more active participant in system development. This approach provides the State with the opportunity for closer oversight and more input on the realization of the system design than the turn-key approach, while securing access to the needed expertise and documentation. The co-development approach will, nonetheless, require the establishment of formal milestones (such as a software review or a functional demonstration of the system) for overall project management.

The primary task in developing an integrated EBT system is writing and debugging system software. The goal of this activity should be the

accurate and efficient processing of all system functions. The compatibility of the software modules with each other should be confirmed through integrated testing, which should be repeated when flaws in individual modules are fixed. The effort required will depend on the system design and the extent to which the basic software package must be modified to meet design requirements.

One important subsidiary task to facilitate software development and testing is preparing equipment. Developers need access to the type of equipment specified by the design, and they should conduct integrated testing on the actual equipment configuration that will be used in operations. Depending on the hardware requirements of the design and the existing hardware at the State data center, equipment preparation activities may include procuring new equipment, modifying new or existing equipment, and testing.

Another subsidiary activity for EBT system development is preparing communications facilities. An EBT system must have sufficient telephone lines to support peak-period demand for communication with POS terminals, balance inquiry terminals, and remote workstations. The development team should review the line requirements identified during the design stage, determine the availability of existing lines to meet these requirements, and arrange for the installation of additional lines.

Interim system testing is necessary to make sure that the EBT software modules and equipment will function together as designed. This testing requires the installation of the EBT software on the State's computer system. The tests should address all functional specifications, capacity requirements, performance standards, and interfaces between the EBT system and other systems. As EBT system development enters this stage, the involvement of State technical and program staff becomes increasingly desirable. State staff can begin to familiarize themselves with the EBT system and help identify problems of which developers may be unaware.

The EBT system development team should devote substantial effort to documenting the system design and operating procedures. The design documentation should accurately reflect any changes made during the development process. Issues to be considered when developing operating procedures include skill and staffing requirements, ease of use, security, production scheduling, and impacts on existing operations and activities.

Preparations for EBT system implementation should begin during the development stage. These preparations include: determining who will be responsible for system implementation tasks; preparing a realistic schedule for system implementation; preparing training materials and plans for retailers, recipients, and system operating staff; recruiting retailers for system participation; and establishing necessary agreements for system operations. Retailer recruiting should begin in the design phase with publicity, general meetings, and contacts with retailer representatives. A carefully framed contract is needed to establish terms of retailer participation. Other agreements will be needed with the system's clearinghouse bank, with FNS, and with service contractors.

ACCEPTANCE TEST ACTIVITIES

The final stage prior to the implementation of an integrated EBT system is the acceptance test. The acceptance test assesses both the EBT system's ability to operate according to the functional and performance requirements of the design and the State's and contractor's readiness to implement the system. The State should form a task group of major participants in system development and operations to oversee all steps of the acceptance testing process.

The first step in the acceptance testing process is preparing the Acceptance Test Plan. This document should lay out the approach for acceptance testing, including the functions and performance characteristics (including processing speed and capacity) to be tested, the testing methodology, the test environment, and the schedule. The Acceptance Test Plan could be prepared by a development contractor, State staff, an independent consultant, or some combination of these groups. Preparation of a thorough and sound Acceptance Test Plan requires expertise in the technology used by the EBT system and understanding of the particular EBT design and its operating environment. It is equally important that the persons preparing the test plan are sufficiently objective to ensure a fair and complete test.

The next and most time-consuming step of the acceptance testing process is preparing the acceptance test scripts. These scripts should present in detail the steps that will be taken to conduct and evaluate each component of the system. The acceptance test scripts should include:

staffing and hardware requirements for the test; initial data values; procedures and expected results for functional tests; procedures and expected results for performance tests; a orms for recording test results.

The simplest approach this task is to assign it to the party responsible for preparing the Acceptance Test Plan. The greater level of technical detail required in the test scripts, however, may necessitate assignment of this task to the system developer or an independent consultant, with input and oversight from the other members of the task group. While comprehensive scripts are vital to an effective test, participants should also be permitted to test "what if" scenarios not included in the formal scripts.

Before the actual test can be conducted, the State and other test participants must complete several tasks to prepare for the acceptance test. All necessary equipment and software must be in place. Everyone who will participate in the test must understand his or her responsibilities and how to execute them. Test data files and forms must be created, and benefits must be authorized and posted to recipient accounts for any live purchases to be transacted during the test. The State may serve as liaison to the party conducting the test or take the lead in test preparations.

To the greatest extent possible, representatives of all groups who will participate in live system operations should be involved in conducting the acceptance test. The test could be supervised by the developer, by State staff, or by an independent consultant. The choice among these approaches involves tradeoffs between efficiency of means and reliability of results. State staff can learn more about the system by participating actively in the test, but they may need technical assistance from the developer or a consultant. The use of an outside consultant will add to the cost of testing and the time required, but the technical expertise and objectivity provided by a consultant may be critically important to the acceptance test.

During the acceptance test, problems or errors should be noted and categorized in terms of severity. This categorization of test discrepancies is useful in evaluating the test results and prioritizing problems for resolution.

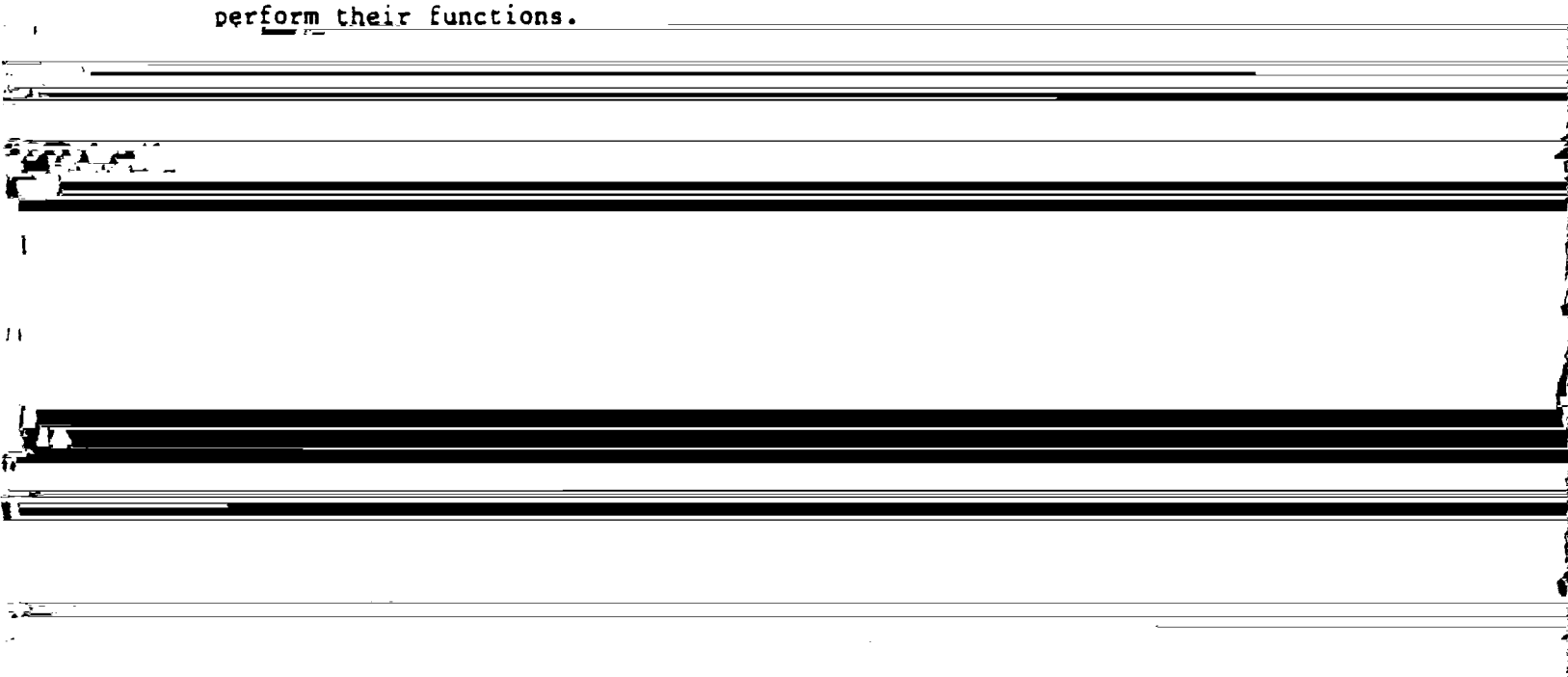
As acceptance test segments are completed, the task group should begin evaluating the test results. Each test discrepancy should be assessed in order of priority, and plans for resolving it should be made.

The participants in the review process should also assess the organizational readiness of the State (or the contractor, if turn-key implementation is planned). The staff responsible for implementation and start-up operations should understand all aspects of the system relevant to their responsibilities. The plans and schedules for implementation should be realistic and thorough, and all training materials, agreements, and other preparations for implementation should be complete.

The task group should prepare a summary of the evaluation of test results and organizational readiness. This document should present overall results, summaries of test sections, and descriptions of discrepancies. The evaluation document should provide the basis for the State's decision to accept the system or require further development and testing. Depending on the outcome of the evaluation process, a second acceptance test may be necessary before system implementation can begin.

SYSTEM IMPLEMENTATION ACTIVITIES

Once an EBT system has been accepted by food stamp authorities, implementation activities can begin. The management requirements for implementation of an integrated EBT system are considerable: large numbers of recipients, retailers, and operations staff must be trained and equipped to perform their functions.



the capacity to bring retailers and recipients into the EBT system, the State may consider phasing in these participants. Unless the pilot area is quite small, limits on the capacity of local welfare offices will probably require staggering recipient training over several months. Retailer training and equipment installation should be completed before start-up if possible, unless the pilot area is so large that too much time would elapse between the

center, local welfare offices, store equipment service facilities, and other field sites) must be physically prepared for EBT operations, and final procedures for EBT system implementation and operations must be developed. EBT operations staff at all sites must be trained, and any special assignments for the start-up period need to be made.

The tasks for retailer preparation require the greatest proportion of the effort to prepare for EBT system start-up. Retailers must be equipped with POS terminals, printers, and necessary telephone and power lines. This process requires coordination with the retailers, the telephone company, electrical contractor, FNS (to confirm retailer authorization), and the vendor installing the equipment. Retailer data must be entered on the EBT system. Retailers should be issued a complete, up-to-date operating manual and provided with comprehensive, hands-on training.

Banks in the EBT project area should be notified well before the start-up date. The implementation team must make sure that the clearinghouse institution and the Federal Reserve are prepared to fulfill their roles in the EBT system. All ACH prenotification forms for retailer accounts should be submitted early enough to avoid delays in crediting retailers once operations begin. Retailers' banks should be notified of the start-up date and informed of an appropriate contact to resolve problems. Other groups that should be notified are State coupon management staff and local issuance agents or coupon delivery contractors, because their workloads will be reduced as recipients begin receiving electronically stored benefits.

EBT system start-up activities begin with loading the production data base and recipient notification. System control files created during development must be updated, and all retailer and terminal data must be entered and verified. Using several media, the State should inform all recipients prior to start-up of the planned implementation date and the changes the EBT system will bring to them.

Once recipient accounts have been set up and benefits posted, the training of recipients to use the EBT system can begin. The requirements for recipient training include: scheduling recipients for training, issuing transaction cards, providing recipients with handbooks and other training materials, conducting training sessions, and taking action in cases where the recipient fails to appear for training. Throughout this process, program

requirements and the capabilities of the recipients must be taken into account.

Even the best retailer and recipient training will not prevent some problems from arising during start-up operations. The State or its contractors should provide additional assistance to retailers and recipients during this critical period. This assistance could include extra hotline staff (to handle calls for assistance), roving teams of facilitators, or on-site facilitators in high-volume locations. Additional staffing may be required for such customer service functions as repairing retailer equipment and replacing recipient cards. Community organizations may be a useful resource for assistance to recipients, especially the disabled and others with special needs.

Monitoring operations during start-up and phase-in is an important function for EBT system managers. The activities of all participant groups and the problems they encounter should be monitored using system-generated reports, field observation, and input from participants. The implementation team should establish an effective mechanism for synthesizing the monitoring data and responding to problems. Periodic progress reports and meetings can be used as tools for monitoring implementation and making necessary decisions.

The transition to steady-state operations occurs once all implementation tasks have been completed and problems occurring during system start-up have been resolved. This transition may involve extensive training of State staff (if implementation has been done on a turn-key basis), or it may entail only a shift from relatively senior State staff to mid-level managers and more junior operations personnel.

Once the EBT system has operated at steady-state for the pilot phase, the next step is evaluating whether the system can and should be expanded. The strengths and weaknesses of the system should be assessed from the perspectives of administrative costs, technical performance, ease of use, security, and participant satisfaction. The evaluation of the feasibility of expanding the EBT system should also consider the likely costs and benefits of expansion, including the costs of necessary or desired improvements to the EBT system. Finally, the State will need to obtain the necessary resources, the cooperation of participants, and the permission of FNS to expand.

Chapter One

INTRODUCTION

The Food Stamp Program assists needy households by providing benefits which can be used to purchase groceries. At present, the program issues monthly benefits in the form of food stamp coupons, each with a specified face value. Recipients redeem their benefits at authorized retail food stores, which receive cash credit when they deposit the coupons at their local banks. The banks receive credit when they send the coupons to a Federal Reserve Bank, which debits the program's redemption account at the U.S. Treasury.

For several years, the Food and Nutrition Service (FNS) of the United States Department of Agriculture (USDA) has been investigating alternative methods for issuing and redeeming benefits under the Food Stamp Program. The goal of this effort is to reduce the cost of issuing program benefits and the vulnerability of the program to fraud and abuse. One alternative for benefit issuance and redemption is the use of point-of-sale (POS) and electronic-funds-transfer (EFT) technologies to create an Electronic Benefit Transfer (EBT) system. FNS has sponsored an ongoing demonstration of an EBT system in Reading, Pennsylvania.

In the first part of the Reading demonstration, FNS contracted with a systems engineering firm, Planning Research Corporation (PRC), to create and operate an on-line EBT system. This period, which ended in December 1985, is referred to in this report as the "original demonstration." In January 1986, the Pennsylvania Department of Public Welfare (PDPW) assumed operational responsibility for the Reading EBT system, under an agreement with FNS. This action began the "extended demonstration," which is ongoing at present.

Despite the high cost of operating the first EBT system, the positive response of participants to the Reading demonstration[1] and the widespread interest in the potential benefits of EBT systems have led FNS to continue this line of research. FNS has sponsored four State-initiated EBT

[1]The results of the first portion of the Reading EBT demonstration are presented in William L. Hamilton et al., The Impact of an Electronic Benefit Transfer System in the Food Stamp Program. Cambridge, Massachusetts: Abt Associates Inc., May 1987.

demonstrations in Arizona, Minnesota, New Mexico and Washington. These demonstrations will test the feasibility and cost-effectiveness of implementing EBT systems that differ from the Reading systems in two aspects: all will be vendor-operated, and all will incorporate cash assistance programs as well as food stamp benefits.

FNS has also issued guidelines under which States may conduct unsolicited EBT demonstrations. These guidelines constitute the framework for any new EBT demonstrations in the immediate future. The outcomes of the State-initiated projects and any unsolicited demonstrations are likely to shape future FNS initiatives in the area of EBT systems, as will the final results from the evaluation of the Reading demonstration.[1]

1.1 PURPOSE OF THIS REPORT

This report offers information for State Agencies that are considering the design, development, and implementation of an EBT system. The focus is on identifying the steps required to bring an EBT system from initial design through to live operations, and on framing the choices faced at each step. A major theme is how a State's decisions may subsequently affect its system's costs and operating characteristics. The report is not intended to prescribe specific choices, since each State's path will be shaped by its priorities, resources, and circumstances.

Throughout this report, the discussion draws on examples and events from the Reading EBT demonstration. This body of experience is a source of useful illustrations of the development and implementation process. It also provides insight into the challenges that may be encountered and the consequences of choices made at each stage.

While current legislation governing the Food Stamp Program (FSP) requires benefits to be issued in the form of coupons, FNS regulations permit States to test EBT as an issuance alternative, under demonstration waivers. Current research focuses on what types of on-line EBT systems are most cost-

[1]The evaluation findings regarding the State-operated Reading EBT system are presented in: John A. Kirlin et al., The Impacts of the State-Operated Electronic Benefit Transfer System in Reading, Pennsylvania, Cambridge, MA: Abt Associates Inc., (forthcoming).

effective and whether these systems are sufficiently secure against benefit loss and acceptable to FSP participants. This report is intended to serve as a bridge between those who have already contributed to the development of the EBT concept and those who will contribute in the future.

1.2 POLICY OBJECTIVES FOR EBT SYSTEMS

Although several types of EBT systems are possible, the concept underlying them is the replacement of paper food stamp coupons and issuance documents with electronically stored and transmitted benefit data. This change has several potential advantages for the Food Stamp Program.

An EBT system has the potential to improve the accountability of the FSP in a number of ways. The amount of benefits issued to each recipient can be immediately reconciled with the amount authorized. In contrast, issuance reconciliation in a system using Authorization-to-Participate (ATP) documents must wait for the return of cancelled ATPs by issuance offices. Moreover, an EBT system can track the entire flow of benefits from authorization through issuance and redemption. Such a comprehensive benefit tracking system is not possible in the coupon-based system.

Another reason for interest in EBT systems is the potential for reducing the administrative cost of issuing and redeeming food stamp benefits. An EBT system eliminates the costs of producing, handling, and accounting for the many paper documents currently used in the FSP. Over 2 billion coupons are printed each year. In addition, States must produce large numbers of issuance documents (such as Authorization-to-Participate cards) and reconciliation reports (on losses from unauthorized issuances and coupon inventory shrinkage). EBT systems, however, do require new resources, such as central data processing facilities and POS terminals deployed in stores. Whether EBT systems will have lower operating costs than paper-based issuance systems in the long run will depend on the cost of the EBT hardware and the economies of scale in its use.

FNS and some States have been interested in EBT systems' potential to reduce the vulnerability of the FSP to fraud and abuse. Food stamp coupons and paper issuance documents are vulnerable to counterfeiting, theft, loss, and unauthorized transfers (such as exchanging coupons for cash). While measurable losses and diversions in the issuance process are relatively small

compared to losses in the certification process, any misuse of benefits undermines the integrity and image of the FSP in the eyes of the public. An EBT system eliminates paper documents and makes it harder for anyone but authorized recipients and retailers to gain access to food stamp benefits. However, an EBT system's reliance on electronically transmitted and stored data may create other vulnerabilities to fraud and abuse if adequate safeguards are not provided in the system design.

An EBT system could make food stamp redemption more compatible with commercial modes of payment. With an EBT system, participating retailers do not have to handle food stamp coupons, make change in coupons, or complete redemption certificates. Retailers view all of these activities as burdensome exceptions to their normal operating procedures. The separate handling of coupons, redemption certificates, and Food Coupon Deposit Documents is also a burden on the banking system. As commercial direct-debit systems of payment become more widespread, EBT systems will offer food stamp recipients a payment mechanism similar to that used by other store customers.

EBT systems could provide an additional advantage beyond the FSP as a starting point for integration of benefit delivery with other assistance programs. Many States have already integrated their food stamp recipient data bases with those of other assistance programs, including Aid to Families with Dependent Children (AFDC) and Medicaid. In some areas, a single issuance agent delivers AFDC checks and food stamp coupons. An EBT system could be used to carry this integration one step further by using a single benefit card as the access device for cash assistance, FSP benefits, and other programs. Such integration could enhance the sharing of information among programs, provide additional security for the programs and the recipients, and reduce administrative costs by sharing resources.

1.3 FUNCTIONAL DESCRIPTION OF AN ON-LINE EBT SYSTEM

An EBT system may be "on-line" or "off-line". An on-line EBT system is one in which all transactions require immediate authorization from a central computer. In an off-line EBT system, the authorization for a transaction may come from the recipient's card, and the communication between the store and the EBT system may occur hours later. This report specifically addresses the implementation of on-line EBT systems, because the experience on

which it is based involves only on-line systems.[1] In addition, some varieties of off-line systems (i.e., those that do not store the recipient's benefits on the access card) do not check the recipient's remaining balance until after the purchase has been made. It is unlikely that this approach would be acceptable in the FSP.

An on-line EBT system allows recipients direct access to benefits at the point of sale without the use of coupons. Instead of sending coupons or issuance documents to the recipient by mail (or by delivery to an issuing agent), an on-line EBT system records the recipient's monthly allotment in a computerized account. The recipient is issued an electronically encoded benefit card which he or she uses with a personal identification number (PIN) for identification at the point of sale. Each participating retailer is provided with one or more benefit transaction terminals (similar to credit card authorization terminals) and a telephone link to the EBT computer. The recipient uses the benefits by initiating an electronic transaction within the EBT system that results in an immediate debit to his or her account and a simultaneous credit to the retailer's EBT system account.

An EBT system uses electronic funds transfers to reimburse retailers for food stamp sales. This technology replaces the manual counting, cancellation, and transfer of coupons by retailers, commercial banks, and the Federal Reserve. The EBT system tabulates the merchant's total credits each day. Each business day, these credits are transmitted electronically to the retailers' bank accounts through an EFT network, such as the Automated Clearing House (ACH) system. Benefit funds from USDA are transferred electronically to the bank that initiates the retailer credits.

Ideally, an on-line EBT system minimizes exposure to overdrafts by requiring on-line authorization of all EBT sales. This requirement guarantees that the recipient has sufficient benefits to pay for the purchase and that the recipient's balance will be immediately updated. An EBT system may permit manually authorized sales in special circumstances (such as computer downtime) to ensure that recipients can obtain essential food at all times.

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[1]Issues concerning off-line EBT systems are discussed in Paul F.P. Coenen et al., The Feasibility of an Off-Line Electronic Benefit Transfer System for the Food Stamp Program, Atlanta: Electronic Strategy Associates, Inc. and Abt Associates Inc., February 1988.

1.4 MODEL . :R AN ON-LINE EBT SYSTEM

There e several po.sible models for an on-line EBT system. The choices that define these models are:

- To what extent does the EBT system share resources (such as computers, support staff, POS terminals, and telephone lines) with other users?
- hat as:istance programs and/or :ommercial POS applications share the EBT system with the FSP?

Another fundamental choice is whether the EBT system is operated by the State or a contractor. This choice is independent of the EBT system model, although some combinations of model and operator are more logical than others.

In the independent model, the EBT system uses dedicated processing capabilities and a dedicated terminal network, serving only the FSP. Such a system could be operated by the State or a vendor. In the original Reading demonstration, PRC used this model in designing its EBT system, which it operated from October 1984 to December 1985. During the first 18 months of the extended Reading demonstration, the PRC-designed EBT system continued to operate under PDPW's control.

The independent EBT system is, in some respects, relatively simple to set up and operate, because it does not require as much interaction with actors or systems outside the FSP as other models. However, an independent EBT system .s not likely to be cost-effective to operate on any but the largest scale, because of the staffing and equipment required to ensure that recipients can shop whenever and wherever they want without unreasonable delays.

Any EBT system in which central processing facilities are shared with other applications is an integrated EBT system. In redesigning the EBT system for the extended demonstration, PDPW introduced the integrated Food Stamp-only model. The PDPW EBT system, which began operations in June 1987, shares processing capabilities with other State data processing functions, but the terminal network is deployed and used solely for food stamp benefit transactions. In the ost likely version of this model, the EBT system is designed to use the Stat (or a contractor's) existing computer facilities, since an EBT system alone probably would not justify investment in a whole new computer facility.

An integrated food stamp-only EBT system is more complex to design and administer than an independent EBT system, because of the interaction with other data processing operations and the use of existing hardware (for which ready-to-run software may not exist). An integrated EBT system is more efficient than an independent system, however, because it can share resources that must be available but are not always used (such as computer operators).

An integrated food stamp-only EBT system would probably be operated by the State, unless the State contracts out its other FSP data processing. A vendor of computer time that had no relationship with the State except the operation of a food stamp-only EBT system might not have enough of a stake in the system's success to be sufficiently reliable.

In the multi-program model, the same benefit card and processing capabilities are used for food stamp issuance and redemption and for other benefit programs, such as AFDC and Medicaid. The multi-program model has the potential to reduce benefit delivery costs for several programs by spreading the fixed cost of computers and staff over multiple issuance systems. A multi-program EBT system could reduce AFDC issuance costs, for instance, by issuing cash benefits through existing automatic teller machines. Recipients could use either AFDC or food stamp benefits at POS terminals in grocery stores. Finally, the benefit card could be used at health care facilities, pharmacies, and other sites for on-line verification of eligibility for Medicaid.[1]

The integrated EBT/POS model offers the prospect of efficiency gains through integration with a commercial POS network or an EFT network capable of processing POS transactions. Under this model, some or all of the store terminals and processing capabilities required for the EBT system could be shared with users of commercial services, such as direct debit, check authorization, or credit card draft capture. An integrated EBT/POS system could, of course, serve other government programs as well as the FSP. The issues

[1]Some issues concerning multi-program EBT systems are addressed in Coenen et al., op. cit..

surrounding the design and implementation of an integrated EBT/POS system are addressed in a separate report.[1]

This report concentrates on the issues pertaining to an integrated on-line, food stamp-only EBT system, the most practical of the two models implemented to date. Many of the considerations, however, also are relevant to other integrated system models, including multi-program and integrated EBT/POS systems. As noted previously, other reports prepared or under preparation for FNS discuss these other types of EBT systems in greater detail. The evaluation of the extended Reading demonstration has also produced a report on the feasibility of a nationwide EBT system under a variety of scenarios.[2]

1.5 GUIDE TO THE REPORT

Following this introductory chapter, the report provides background information on the events in the Reading EBT demonstration that are significant for other EBT system efforts. Separate chapters then discuss each of the four stages involved in establishing an EBT system: system design, development, testing, and implementation. Major topics addressed in each chapter are:

Chapter Two: Overview of the Reading EBT demonstration, including the FNS/PRC system, takeover and interim operation of the FNS/PRC system by PDPW, and redesign of the EBT system by PDPW.

Chapter Three: Designing an integrated EBT system, including assembling a project team, specifying the general system design, defining functional and performance requirements, and preparing the detailed system design.

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[1] John A. Kirlin and Charles R. King, Implementation Issues for Integrated EBT/Commercial POS Systems, Cambridge, MA: Abt Associates Inc., (forthcoming).

[2] John A. Kirlin et al., The Feasibility of a Nationwide Electronic Benefit Transfer System for the Food Stamp Program, Cambridge, MA: Abt Associates Inc., (forthcoming).

Chapter Four: Developing an integrated EBT system, including software development, equipment and communications preparation, system testing, documentation, and preparations for implementation.

Chapter Five: Acceptance testing for an integrated EBT system, including the test plan and scripts, preparation for the test, conducting the test, and evaluation and follow-up.

Chapter Six: Implementing an integrated EBT system, including alternative approaches, preparations for start-up at the data center and field sites, retailer and recipient training, monitoring operations, and the transition to steady-state operations.

Although the report discusses each of the four stages separately, some tasks within each stage continue during other stages. To provide a better picture of the timing of tasks and the sequence of events, a conceptual timeline of the entire process of establishing an EBT system is included as Appendix A.

Chapter Two

THE READING, PENNSYLVANIA, EBT DEMONSTRATION

Many problems limit the efficiency and effectiveness of issuance systems based on paper coupons. These systems are costly and difficult to administer. Coupons must be ordered, printed, distributed, stored, and issued. The many handling points in this process create the opportunity for administrative error. Paper-based systems also are vulnerable to certain types of fraud and abuse. Jurisdictions mailing coupons or ATPs incur the risk of losses, either legitimately or falsely reported by recipients. Cases of ATP and coupon theft by program employees and postal service employees have been reported. In addition, the illegal exchange of food stamp coupons for cash or non-food items is a regrettable reality of paper-based issuance systems.

In response to these problems, federal and State food stamp authorities have been seeking less costly and more secure alternatives to the paper-based system. The FNS-sponsored demonstration in Reading, Pennsylvania, has tested the feasibility of one such alternative: an on-line EBT system.

This chapter discusses the five major phases of the Reading EBT demonstration:

- implementation and operation of the original EBT system;
- the decision to extend the EBT demonstration;
- PDPW assumption of system operating responsibilities (Phase A of the extended demonstration);
- PDPW operation of the original EBT system and development of a redesigned system (Phase B); and
- PDPW operation of the redesigned EBT system (Phase C).

2.1 HISTORY OF THE ORIGINAL EBT SYSTEM

In May 1981, FNS announced its intention to sponsor one or more demonstrations of alternative issuance systems. The announcement invited State and local agencies to submit proposals indicating their interest and describing their proposed system.

Because of the complexity of the issues involved, FNS also commissioned a study of the feasibility of employing electronic technologies in the issuance and redemption of program benefits. The solicitation to State and local agencies for proposed issuance system alternatives was suspended pending the outcome of the feasibility study.

The study was released in March of 1982.[1] The principal study conclusion was that an electronic issuance system was technically and economically feasible. The study recommended that FNS sponsor a demonstration to determine the programmatic feasibility of implementing such a system.

The results of the feasibility study prompted FNS to change its research strategy. The solicitation to State and local agencies was cancelled, and, in January 1983, proposals were solicited from independent contractors to design, develop and implement an EBT system. The solicitation focused on functional requirements which were to be met by the system and left technical issues up to the respondents. Prospective contractors were required to submit preliminary system design outlines and a proposed site for the demonstration.

In July 1983, FNS awarded a contract to Planning Research Corporation (PRC) of McLean, Virginia, to carry out a demonstration of an EBT system. PRC proposed an on-line, direct debit system involving automated communications between a central computer and store terminals during transaction processing. The demonstration caseload was restricted to those food stamp recipients residing in the four central zip-code areas of Reading, Pennsylvania. All food retailers participating in the Food Stamp Program and located within a five-mile radius of central Reading were invited to take part in the demonstration.

PRC designed, developed, and implemented an on-line EBT system between July 1983 and October 1984. When operations began, 110 participating retail stores were equipped with terminals and accompanying printers at each of their checkout counters. These terminals were attached to [illegible]

located in Reading. PRC conducted retailer training sessions to educate store employees on the operation of the new system.

Participating recipients were phased into the demonstration over a four-month period, beginning in October 1984. Recipients attended training sessions held at the Berks County Assistance Office (BCAO) and conducted by BCAO staff members. At this time, recipients were issued benefit access cards. These cards were a modified version of plastic-laminated photographic identification cards already in use by PDPW. A magnetic stripe embedded in the back of the card was encoded with identifying information, including the recipient's account number and an encrypted version of the recipient-selected personal identification number (PIN).

Monthly benefit allotment amounts were transmitted on tape from the Pennsylvania Department of Public Welfare (PDPW) in Harrisburg to the PRC-staffed EBT computer center in Reading and credited to computer accounts established for each of the participating recipients. Non-recurring benefits were transmitted to the EBT computer by telephone each weekday.

EBT recipients obtained access to their food stamp benefits at the point of sale (POS). The store clerk first rang up the allowable items on the store register. The recipient then presented his or her benefit card to the clerk, who initiated a communication with the central computer by swiping the card through the terminal's card reader. The recipient entered his or her PIN on the terminal PIN pad. If the correct PIN was entered, the clerk entered the purchase amount on the POS terminal. The central computer compared the purchase amount with the recipient's account balance and authorized the purchase when a sufficient balance existed. The purchase amount was debited from the recipient account and credited to an account established for the retailer conducting the transaction. A two-part receipt showing the purchase total and the recipient's remaining balance (following the purchase) was printed at the checkout counter. The recipient retained one copy, and the store kept the other for its records.

Retailers' daily EBT credits were totalled every day at 2:00 p.m. and delivered on computer tape to American Bank and Trust Company (AB&T), the system's clearinghouse bank. AB&T entered the retailer credit information into the Federal Reserve System's Automated Clearing House (ACH) network the

same evening. Retailers' credits were then deposited into accounts at their banks the following morning.

PRC operated the EBT system between October 1984 and December 1985. The PRC system accomplished its required functions but experienced some technical and performance problems. Periods when the system was down and unavailable to process EBT transactions were particularly common during the early stages of the demonstration. Periods of heavy demand (issuance days and the days immediately after) strained the system and lengthened response times. The 2:00 p.m. daily cutoff of retailer EBT credits was unpopular with many retailers, because the difference between store hours and the EBT system's processing "day" complicated retailers' reconciliation efforts.

The PRC EBT system was well-regarded by most program participants, in spite of the technical problems encountered. Most participating retailers preferred it to the coupon system because it eliminated coupon handling, cash change, and, the retailers felt, the likelihood of fraud. Recipients in the demonstration area also preferred the EBT system, citing reduced risk of stolen benefits and other advantages. Local banks appreciated the fact that under the EBT system they no longer processed coupon deposits or served as coupon issuance agents -- two functions they found less productive than alternative uses of their branch offices. Local welfare office staff adapted easily to their roles in the EBT system and benefited from the elimination of the burden of dealing with delayed, lost, and stolen ATPs.

2.2 THE DECISION TO EXTEND THE EBT DEMONSTRATION

The EBT demonstration was originally scheduled to end in December 1985. At that time, Reading recipients and retailers were to return to the ATP/coupon system. The widely-viewed success of the demonstration generated interest in extending the December deadline, which PDPW requested in the Spring of 1985. Participating retailers, through their statewide trade association, lobbied extensively in support of this request. Positive feedback from recipients also suggested support for a continued demonstration. Pennsylvania's Governor and Congressional delegation also advocated this position and urged Federal officials to support continuing EBT system operations.

Interest in extending the EBT demonstration also came from within FNS. The demonstration established the operational feasibility of applying point-of-sale technology to the delivery of food stamp benefits. However, the cost of the demonstration was high, and system performance problems marred the early stages of the demonstration. FNS accepted PDPW's argument that integrating the EBT system into the existing State computing capabilities would mitigate these two problems, as well as provide a more meaningful test of EBT technology for future applications.

On November 11, 1985, USDA announced that the EBT system would continue operations beyond the December deadline under the control of the Commonwealth of Pennsylvania. PDPW and FNS signed an agreement on December 24 outlining the terms of State operations. The agreement focused on system cost and performance issues and outlined a chronology consisting of three phases. The initial phase, known as Phase A, would last three months. During that time, PRC would continue operating the system while PDPW made all necessary preparations for assuming full operational responsibility for the system. PDPW was to relocate the system's computers to its data processing center at the Harrisburg State Hospital (HSH) and assume control of the system at the end of Phase A. Phase B of the extension would allow the State to gain operational experience while preparing to integrate the system onto the State's own computers. Conversion to the integrated EBT system was to initiate Phase C. PDPW would continue to operate the integrated system as a demonstration at least until the agreement expired on April 1, 1988. EBT operations beyond that date would depend on a mutual agreement between PDPW and FNS. The agreement set ceilings on reimbursable costs of $8 per issuance for Phase B and $4 per issuance for Phase C.

2.3 PHASE A OF THE EXTENDED EBT DEMONSTRATION

PDPW addressed a number of organizational and technical issues during the three-month Phase A period. The most immediate issues were: transferring operational responsibility for the stand-alone system from PRC to PDPW, training the staff who would be responsible for operating the system during the Phase B period, and physically relocating the EBT equipment from the Reading-based EBT Center to the State computer center housed at HSH.

TRANSFER OF OPERATIONAL RESPONSIBILITY FROM PRC TO PDPW

The initial task confronted by PDPW during Phase A was to determine how to organize responsibility for each of the EBT functions previously performed by PRC and other contractors. PDPW identified the following seven primary EBT tasks requiring organizational assignment:

- Operation of the EBT Center computers, including the execution of batch processing jobs and responding to system problems.
- Coverage of the 24-hour telephone hotline to answer retailer and recipient calls for assistance.
- Installation, de-installation, repair and provision of supplies for retailer equipment, and associated administrative tasks.
- Maintenance of hardware, including the central computer system and the microcomputers supporting the hotline and the client services provided by BCAO.
- Technical services to resolve problems beyond the scope of maintenance (e.g., software modification).
- Origination of funds transfer transactions to credit retailers and draw on the USDA letter of credit.

PDPW sought to allocate these functions along existing organizational lines as much as possible. This approach would shorten the transition to PDPW operational control, hold down operating costs, and utilize the existing base of expertise. PDPW also concluded that this approach would best maintain the level of service expected by retailers and recipients and comply with the performance standards outlined in its agreement with FNS.

PDPW's final plan was to allocate the EBT functions as follows:

- The Office of Information Systems (OIS) would handle the central computer operations, technical services and share responsibility for the retailer hotline. OIS had the staff and facilities in place and was already performing similar functions on a much larger scale than that of the EBT system.
- OIS would contract out the installation and maintenance of the central computer system, the store terminals and the microcomputers, as it did with all other data processing equipment.

- The State Treasurer's Office would serve as the interface for funds transfer transactions, as required by State law.

- PRC would serve as a consultant for software support and other technical services, making the expertise of the system's designers available.

- BCAO, as the local representative of the EBT system, would share hotline responsibilities with OIS, process requests for store installations and de-installations, train new retailers, provide retailer supplies, and handle other administrative tasks.

TRAINING PDPW STAFF ON SYSTEM OPERATIONS

Under PDPW's plan for operating the EBT system, any of the 100 computer operators in the OIS pool might be required to perform EBT system tasks in addition to regular duties. Since it was impossible to train this entire group prior to takeover, the training of PDPW staff during Phase A involved a core staff of twenty who would first operate the system.

Two senior supervisors observed and participated in running the PRC system on all three shifts in January 1986. Computer operator training began in February and consisted of hands-on practice with EBT functions at the EBT Center in Reading under the direction of PRC lead operators. The supervisors received additional experience to prepare them for future training responsibilities and for developing procedures for OIS operation of the system. Training of operators and supervisors to cover all three shifts of EBT operations was completed prior to the system relocation in late March.

Hands-on training at the EBT center was provided to the Chief of Production Control and one supervisor to prepare for batch processing scheduling, report production and future staff training responsibilities. Account reconciliation and associated report training was also provided by PRC to one supervisor from Production Control.

Hotline training took the form of classroom and hands-on sessions. Classroom sessions were used to provide a general orientation to the EBT system, hands-on training on the microcomputer functions and role playing to practice call-handling procedures. The hands-on segment at the EBT Center included observation of operations and handling live retailer calls.

RELOCATING EBT EQU T F DING TO HARRISBURG

The fina sk d g Phase A was to move the EBT system's computers to Harrisburg. P to move the EBT system equipment to HSH were primarily guided by PDPW's rest in minimizing the adverse i ct of the move on retailers and cli . To a complish this, PDPW chose to separate the sy em into two fully fu oning subsyste s (one system n ally operated as a primary processor and the other as a backup) and mov ch subsystem separately. The separate moves w require three rela y short periods of system naccessibility: the t while the subsysten were separated; the second while the database was backed up, moved and updated; and the third while the two systems were reconnected. The EBT system equipment was moved successfully between March 2 March .

2.4 ASE B OF THE EXTENDED EBT DEMONSTRATION

State activities during Phase B included operating the original EBT system and developing a new system. As described below, PDPW changed some aspects of original system operations at the beginning of Phase B.

PDPW INTRODUCTION OF SYSTEM CHANGES

Relocation of the system to Harrisburg forced PDPW to rethink and revise several aspects of EBT system operations. Specifically, PDPW divided hotline operations between BCAO and the EBT Center in Harrisburg, revised processes for interfacing the system with financial institutions, and installed a telecommunications system to support EBT data transmissions between Reading and Harrisburg.

Division of Hotline Responsibilities. PDPW decided to split hotline operations between BCAO and the EBT Center in Harrisburg in order to satisfy the requirement for 24-hour daily coverage while still maintaining easy access to the EBT system. BCAO staff would handle the hotline during Monday through Friday business hours and so take care of requests for retailer supplies. OIS staff in risburg wou operate the hotline during the remaining hours.

Hotline functions in the PRC EBT syste had been performed with an IBM Personal Computer (PC) system. BCAO used another PC system to initialize new client accounts and to query the status of existing client accounts. The

EBT Center's IBM PC system was moved to Harrisburg for use by the HSH branch of the hotline. Software needed to perform the necessary hotline functions existed on both the BCAO and EBT Center IBM PC systems. The user profiles on both PC systems had to be modified in order to permit full access to all hotline functions.

Integrating EBT Operations into PDPW Operations. PDPW's strategy of integrating EBT operations into the existing organization radically changed the staffing pattern of the EBT system. The PRC EBT system utilized six full-time employees dedicated to system operations. PDPW did not dedicate any staff solely to EBT system operations. The system was operated by the OIS pool of computer operators, each of whom would be doing many other tasks besides EBT operations.

PDPW's strategy facilitated the staffing process in many ways. There was little need for creating new job descriptions and assigning personnel to new positions. Moreover, batch processing was incorporated into existing computer operations, minimizing the need for additional staff or supervision in those areas. Conversely, full integration made it difficult for the State to estimate in advance the actual staff time required to operate the system, since PRC had maintained a fixed level of staffing independent of workload variation.

Changes in Telecommunications. The most complex problem brought on by the move and the division of hotline responsibilities was with the telecommunications network required to operate the system. The Reading-based PRC EBT system was able to utilize local phone lines for all communications (i.e., between retailer terminals and the EBT Center, to the EBT Center Voice Input/Output system for client balances, and for hotline interactions with participants.) The distance between Harrisburg and Reading precluded the use of local phone service for these functions. As a result, PDPW installed the following telecommunications network to handle the demands of the EBT system:

- 6 new Centrex off-premise extensions between Reading and HSH, using the same Reading extension already used for communications between terminals and the EBT Center;
- 2 inward WATS lines to HSH using the same local Reading number for Voice Input/Output for client balances;

- 2 Centrex lines at BCAO with extended call-forwarding capabilities using the same number used for the hotline;
- 1 additional Centrex line at HSH to support dial-up access from the hotline PC at BCAO; and
- Reprogramming of the BCAO IBM PC to phone the new Harrisburg number which would be connected to the EBT system.

All new lines were installed by March 15 in order to allow sufficient testing before the move began. On April 14, the telephone company switched the terminal lines from measured service (as they had been installed for the PRC system) to Centrex service.

In-store Equipment Installation and Service. Prior to the take-over, EBT in-store equipment was installed and serviced by a team of PRC technicians. The lack of in-house expertise prompted PDPW to contract for these tasks with a service vendor. One option available to PDPW was to retain PRC as provider of this service and take advantage of its existing team of technicians' knowledge of both the retailers and the equipment. A second option would contract with the equipment manufacturer to provide this service. The final option, which PDPW selected, was to expand an existing contract with Sperry Corporation, which installed and serviced PDPW computers and terminals. The choice of Sperry was based on cost, the availability of a nearby Sperry facility, and PDPW's long and successful relationship with Sperry.

The contract with Sperry highlighted PDPW's concern for maintaining an acceptable level of service to participants. First, the contract specified a maximum response time of two hours for repair calls (while making it clear to Sperry that PDPW expected a much lower average response time). Second, PDPW met with Sperry representatives to coordinate procedures for requesting service. Finally, OIS worked with Sperry to plan training for service tasks, including the nature of the system and technical training on system terminal and printer features.

System Interface with Financial Institutions. The move to Harrisburg required PDPW to implement a new procedure concerning the Automated Clearing House (ACH) tape of retailer credits. PDPW considered several options. The ACH tape could be sent through the State Treasurer's Office or directly to Commonwealth National Bank (CNB), which handles other funds

transfers for the State Treasury. PDPW also considered electronically transmitting retailer credits, though adequate procedures could not be implemented in time for Phase B.

PDPW originally decided to send the tape to CNB immediately following relocation. Tape delivery to American Bank and Trust (AB&T) of Reading, the ACH interface bank for the PRC EBT system, would serve as a contingency. PDPW later decided to continue sending the tape to AB&T until final arrangements could be made to send the tape to CNB. This delay postponed the need for PDPW to make changes to the tape label format and originating bank number for the transactions. Final changes were completed prior to April 14, when OIS began sending the tapes to CNB.

Computerized Trouble Logs. PRC maintained hand-written logs to provide records of all calls received from recipients and retailers and actions taken. OIS decided to automate the hotline logs in order to simplify the process and provide immediate access to current copies of all logs to both the BCAO and Harrisburg hotline staff. PDPW accomplished this by using the existing "MAPPER" software used at OIS for a variety of applications. Moreover, the MAPPER system operated through Sperry terminals, which were already available at both BCAO and Harrisburg.

CONSEQUENCES OF CHANGES FOR PDPW SYSTEM OPERATIONS

The overall effect of PDPW's takeover of the EBT system was not limited to the system changes instituted by the time the State assumed operational control. Additional benefits and challenges were consequential to changes in the system operations. The assignment of weekday daytime hotline responsibilities to BCAO consolidated recipient interaction functions in one location. Yet, the division of hotline responsibilities between Reading and Harrisburg created the need for greater coordination of activity between the two sites. Integration of operations with existing data processing operations was, for the most part, beneficial, but it required coordination between separate units, each with other unrelated responsibilities.

Consolidation of recipient interaction functions at BCAO was a largely beneficial result of assigning hotline responsibilities to that location. Prior to the State takeover, PRC handled recipient calls to the hotline while BCAO performed other recipient service tasks (i.e., card issuance and

initialization, new client training, etc.). Expanding BCAO's responsibility to include hotline duties concentrated recipient interaction into one location (thus reducing the potential for confusion over having to deal with two separate entities) and increased BCAO's ability to respond to recipients' problems with the system.

The division of hotline responsibili y between BCAO and HSH increased the need for coordination of activity and consistency of response. The electronic MAPPER system and shift-change procedures largely satisfied the need for daily communication between sites, yet did not diminish the requirement for clearly defined and coordinated action among all hotline personnel. The integration of EBT operations into the existing organization meant that both the management of the project and daily operations required coordination between separate units, each with other non-EBT responsibilities. OIS, OIM and BCAO, the major PDPW units responsible for system operations, had to maintain clearly defined communication flows to operate an effective system.

PDPW DEVELOPMENT OF AN INTEGRATED SYSTEM

System Design. Design activities for a new integrated EBT system continued from Phase A through Phase B, in parallel with PDPW's operation of the PRC EBT system. The basic goals for the redesigned system were to improve performance, reduce costs and permit future expansion of the system. PDPW adopted the basic strategy of using commercially available software and components with as few custom features as possible. This approach would contain design and development costs, and be more compatible with other EFT applications by complying more fully with accepted industry standards.

Another key element of PDPW's strategy was a plan to use existing Unisys (formerly Sperry) and Tandem computers and the OMRON POS terminals already in place. PDPW wanted a system capable of expansion to a large-scale system and flexible enough in design to expand into other public assistance programs. Finally, PDPW sought to design a system which would meet the $4 per issuance operating cost standard agreed to with FNS.

PDPW expended a substantial amount of effort in redesigning the EBT system. During the design stage, PDPW researched available electronic-funds-transfer (EFT) and point-of-sale (POS) systems. This research effort assisted PDPW's preparation of functional system specifications to be used as the basis

for vendor agreements. PDPW and its existing mainframe vendor, Unisys, met with several software vendors and eventually selected MTech to provide the software to drive the on-line portion of the system. (Unisys subcontracted with MTech for this service.) Unisys provided the batch processing software and was the primary contractor for system development. During this stage, PDPW also prepared 120-day and 60-day notices to FNS on system design and implementation plans.

MTech's primary effort during the design stage was to assess the feasibility of adapting their software to the EBT system. To assist in this task, MTech conducted a thorough review of the PRC system design and tested communications between the OMRON terminals and a Tandem minicomputer. MTech also prepared general functional specifications and performed detailed design activities.

Unisys designed the batch processes by which daily and monthly reports would be generated. Unisys also assisted PDPW in preparing the 120-day and 60-day notices for FNS.

System Development. Following agreement on system design requirements in September 1986, PDPW and its contractors began developing the integrated system. Primary activities during this stage of the process were software modifications, unit testing, and system installation and testing. MTech worked on adapting its POS software to the EBT system and created new software to perform functions unique to the EBT system. Unisys developed reconciliation and reporting software and made modifications to resolve problems identified in testing.

Testing. Throughout the design and development stages, testing was conducted to ensure that the system would function properly. The final stage before implementation was a series of tests known as the acceptance tests. During the acceptance tests, every aspect of the system was tested to ensure that the system successfully accomplished all necessary functions. System performance and reliability also were tested. The first acceptance test revealed deficiencies in several areas, most notably the reconciliation reports. FNS requested that the State design and conduct a second acceptance test, focusing on the areas in which deficiencies had been identified. Satisfactory completion of the second acceptance test allowed FNS to give PDPW permission to implement the integrated system.

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2.5 PHASE C OF THE EXTENDED EBT DEMONSTRATION

On May 28, 1987, FNS gave PDPW approval to convert to the redesigned system. FNS approval was based on PDPW's demonstration of system readiness through the documentation provided by PDPW and by FNS' satisfaction with the acceptance tests. PDPW transferred operations to the new system on June 22.

DIFFERENCES BETWEEN THE ORIGINAL AND REDESIGNED EBT SYSTEMS

The primary difference between the PDPW and PRC systems is in the utilization of system equipment. Functionally, the two systems are equivalent. However, the PRC system computers were totally dedicated to EBT operations. The PDPW system is fully integrated into the existing PDPW

This software permits in-house maintenance and enhancement, since it was written in COBOL. The reconciliation reporting process was redesigned to operate more automatically and to generate more interpretable reports.

INITIAL OPERATIONS OF THE REDESIGNED SYSTEM

The redesigned EBT system has been evaluated along the dimensions of performance and administrative cost. The evaluation also determined the impacts of the redesigned system on retailers, recipients, financial institutions, and State and local staff. The results of this evaluation are presented in a separate report.[1] For the present report, some preliminary evidence on system performance and operations was assembled.

Early experience with the integrated system has largely confirmed the expectation of improved system performance. All regular monthly issuances have been posted smoothly, and the system has handled the processing systems demands of issuance periods well.

Batch and on-line processing speeds have improved measurably over the PRC system. For example, the regular monthly issuance takes only seven to eight minutes with the new system, compared with three to four hours in the past. The bundle-up of retailer credits and related file maintenance procedures are now completed in fifteen to twenty minutes. Bundle-up alone took thirty minutes during Phase B. Batch processing times are faster because both computer systems used by PDPW (Unisys and Tandem) have greater capacity than the IBM Series/1 system used by PRC.

Retailers have reported marked improvements in system performance and availability. Retailers encounter fewer busy signals, make fewer manual sales, and find that the new system is sometimes as fast as payment by cash. Retailers also have not encountered the usual system slowdowns caused by heavy demand placed on the system during issuance periods.

During the initial months of PDPW EBT system operations, a number of flaws in the reconciliation reporting software were discovered. In some cases, the reconciliation software ignored transactions processed by the on-line software. One flaw caused several transactions to be duplicated in the

[1] Kirlin et al., op. cit.

batch processing system, resulting in overpayments to retailers as well as inaccurate client balances. By February 1988, PDPW staff had corrected the software flaws and automated the final stage of the daily system reconciliation, which previously was a complicated manual task.

Other minor problems hampered the PDPW EBT system during early operations. Replacement of balance-only terminals (BOT) was delayed beyond the date of system conversion, causing the unavailability of this service at several locations. Moreover, the lack of instructional material on BOT procedures caused lines to form in at least one store while recipients attempted to access balance information.

On June 29, 1987, there was a malfunction in a disk pack containing data for daily reconciliation reports. The data had not been backed up (due to an operator oversight), so it was necessary to regenerate the file from system log files of June 22 through June 29. Although all data were subsequently recovered, this seven-hour operation delayed submission of the ACH tape by one day. Since this incident, system operating procedures appear to have functioned properly.

Interruption of telephone service between Reading and Harrisburg has caused the redesigned EBT system to be inaccessible to retailers on two occasions. On October 13, a cable cut by the telephone company caused over 5 hours of inaccessibility. A similar incident caused over 3 hours of inaccessibility on November 6, one day after the first issuance day of the month. These incidents led PDPW to arrange alternatives for routing EBT transactions in the event of future outages. On January 17, 1988, the EBT system was unavailable for 12 hours because of an unprecedented failure of the regular and emergency power source at the PDPW data center.

Beginning in October 1987, the number of transactions reversed by the PDPW EBT system began to rise sharply, reaching levels above the performance standards set by FNS. (Transactions can be reversed because of communications problems or actions by a clerk.) A few stores have failed to note reversals and, as a result, allowed recipients to leave without processing a complete transaction. The known instances of this oversight have been corrected by manual sales arranged by BCAO. One reason for the reversals may be that some store terminals are becoming less reliable as they enter their fourth year of service. PDPW is investigating this possibility and

other potential factors, such as clerks cancelling transactions because of errors or unfamiliarity with the system.

The problems encountered in operating the PDPW EBT system have been, for the most part, relatively minor and remediable. The PDPW system appears to have met the goals of improved reliability and ease of use. However, the variety and, in some cases, seriousness of the difficulties highlight the complexity of EBT systems and the importance of careful design, development, and testing.

Chapter Three

DESIGNING AN INTEGRATED EBT SYSTEM

The design stage is a critical phase in the creation of an EBT system. The system design will determine what tasks the system will be able to do and, to a large degree, how well it will do them. In the design process, program staff have their best opportunity to establish expectations for the system, regardless of whether it will be developed by State data processing staff or a vendor. If system development is to be contracted out, the design will be part of the agreement with the developer. From a management perspective, unresolved design issues can delay or derail system development and implementation.

A State may choose from a range of options in formulating the design for its EBT system. It may build the system around "off-the-shelf" POS software that requires only minimal customization, or it can design the system independently from scratch. POS software is available in modules to perform a variety of functions, including transaction authorization, settlement, terminal interface, and administrative operations. The State may have its staff closely involved in all phases of the design effort, or it may establish only broad guidelines and delegate the rest of the design to a contractor, subject to State acceptance.

There is, however, a common set of tasks that a State will face in designing an EBT system, regardless of the process chosen. These are:

- assembling a project team with required expertise in EFT and POS operations;
- specifying the general features of the design of the EBT system;
- defining the functional requirements for the EBT system;
- specifying other system design requirements, such as capacity, performance standards, and requirements for integration with program operations; and
- producing and reviewing the detailed system design.

For the most part, these five tasks must be performed sequentially. Some specific subtasks, however, may overlap with others in terms of when they

occur. The concepte ...eline for EBT system design, development, testing, and implementation p ...nted in Appendix A points out some of these overlapping perio...s.

The following sections of this chapter discuss the five design tasks listed above and ...plain how some of the tasks are shaped by FSP requirements and pr...ticality. The experience of PRC, FNS, and PDPW in designing the two Reading EBT systems provides va...able examples and insights into the design process.

3.1 ASSEMBLING THE PROJECT TEAM

The process of design...g an EBT system begins with people: a ...ate Agency working group that will be responsible for seeing the project through from initial planning to the detailed system design and beyond. This group should include representatives of program and data processing units, so that the expertise and perspectives of both sides can shape the decision-making. Group members should possess extensive knowledge of FSP requirements, State and local program operations, and existing State computer systems. High-level managers should be involved, so that they understand the issues, can commit the necessary resources, and are available to resolve differences among technical and program perspectives. Staff-level involvement also is important, both to provide support for policy decisions and to establish a working relationship that can carry over through the development and implementation stages.

The working group should be clear on the source and nature of its mandate to design an EBT system. The mandate may come from a combination of sources, including State leadership, FNS, recipients, retailers, banks, and the general public. Each of these constituencies has its own reasons for encouraging EBT system development. State and FNS interests focus on administrative costs and benefit losses, while other groups may be more concerned with the inconvenience of handling coupons. Banks and other potential EBT system vendors are interested in building the market for POS services and positioning themselves to serve that market. The balance of these interests will differ from state to state and should be taken into account in setting the goals and priorities for the EBT system.

The working group needs to have "POS literacy": an understanding of the current state of POS and EFT systems. Staff with POS training or experience are highly valuable sources of this expertise, but it is important for all group members to have some familiarity with basic POS concepts and existing POS systems. Newsletters and books on the POS industry, technical assistance materials from FNS, and visits to live POS operations are useful resources for developing POS literacy. PDPW staff had a unique opportunity to learn about POS operations: they interacted with the PRC EBT system on a daily basis (during the original demonstration) and then operated it themselves. In addition, they visited commercial POS installations and talked to both system operators and users.

State personnel also should familiarize themselves with the standards of the POS industry, including those of equipment suppliers, financial institutions, and networks. These standards are especially important if the system is to be able to interact with commercial POS systems. Furthermore, an EBT system design that incorporates industry standards is likely to be less expensive to implement and maintain because there will be more options in the selection of hardware and maintenance vendors. Relevant standards include those that apply to magnetic stripe cards, POS terminals, data encryption, data communications, and electronic funds transfer.[1]

The project team should review applicable federal and State laws and regulations. The primary source of these rules is FNS, which establishes both the general FSP regulations and the specific requirements for EBT systems. At present, EBT systems are permissible only under demonstration waivers from FNS. In addition, EBT systems differ from many other FSP innovations at the State level in that they involve not only the recipient and the Food Stamp Agency, but also food merchants, their banks, and the general public. Thus, the EBT system will be governed by a wider set of rules beyond FNS regulations and State FSP policy, including banking regulations and legislation pertaining to security and privacy.

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[1]The standards that affect EBT systems and the organizations that provide them are discussed in Coenen et al., op. cit., Appendix D. In addition, see American Bankers Association, Guidelines for Online Debit Card Systems at the Point of Sale, (1987). These guidelines are expected to influence future POS system design and operating decisions.

The working group should consider the resources at their disposal for designing, developing, testing, and implementing an EBT system. The State Agency , perhaps the most important resource, because of the money and equipment it can provide and the organizational capability needed to carry the project through to successful completion. Smooth coordination between separate divisions or even departments will be needed because of the interaction between the EBT technology and program operations. It is important to consider how this coordination can best be achieved.

The process of acquiring POS literacy will provide insights into the technical resources available in the marketplace, including hardware, software and communications networks. Important considerations include the state of the technology, the capabilities and reputations of vendors, the vendors' understanding of government programs (especially the FSP), and the costs of different design options. A State may wish to carry this process further and solicit statements of capability or informational presentations from vendors. As noted in Chapter 2, FNS commissioned a feasibility study before developing the original EBT demonstration solicitation. PDPW sought the advice of major vendors of POS processing hardware to identify the leading POS software providers. Other States also may find it desirable to discuss technical resource requirements with their current hardware vendors, inasmuch as these vendors may have direct experience with POS installations. Moreover, a State that plans to use its existing processing hardware in an EBT system should design that system around the hardware's capabilities and requirements.

FNS is another important source of resources for EBT system design. Under the guidelines for unsolicited demonstrations, States can get 50/50 matching funds from FNS for approved development costs (up to a budget cap set by FNS). FNS can also provide technical assistance through evaluation reports, other publications, and the expertise of staff. In the case of the extended EBT demonstration, FNS procured outside technical assistance for PDPW (and for its own needs) as part of an evaluation contract.

Before undertaking the actual system design, a State should establish priorities among the dimensions that will have to be traded off against one another. These dimensions include implementation cost, operating efficiency, performance, vulnerability to benefit loss, flexibility to expand or support additional applications, and ability to interface with other POS

systems. For example, one type of POS terminal might be less expensive to purchase, but another might be faster and more reliable. A critical factor in PDPW's choice of EBT software was that the State preferred an easily maintained system (with adequate processing speeds to meet FNS standards) to one that was faster but required software expertise that the State staff lacked. The State may not have to make precise tradeoffs until the detailed design stage, but it should establish its basic priorities as early and explicitly as possible.

The final preparatory step is establishing a realistic schedule of events. This schedule should identify important milestones, such as completion of the general system design, selection of the development vendor (if planned), completion of the detailed system design, design review, acceptance testing, and system implementation. In establishing this schedule, the project team should balance the natural desire to minimize development time with a pragmatic appraisal of the effort required to reach the milestones. The schedule must be credible not only internally but also to outside parties (such as retailers) who will be involved in system implementation and operations. The schedule should be reviewed and revised throughout the project, especially when a milestone is reached.

3.2 SPECIFYING THE GENERAL FEATURES OF SYSTEM DESIGN

A State's EBT project team should begin the process of designing an EBT system by specifying the general features of system design. This task should address four main questions:

- What will be the basic system model?
- Who will operate the system?
- What area will be served by the EBT system?
- What will be the system's general functional requirements, performance standards, and other general design parameters?

The State should formulate a general EBT system design regardless of its role in the actual development of the EBT system. A general system design provides guidance for any detailed design work to be performed by State staff. If the State plans to use existing POS software modules, it will need

a general design to guide the selection of the software and to identify requirements for custom design work. If the system is to be developed by a contractor, a general system design will be needed to direct contractors' proposal efforts.

CHOOSING THE BASIC SYSTEM MODEL

The first step in formulating a general EBT system design is choosing the basic model for the system. The goal of this step, and throughout the design process, should be to ensure that the system will meet the State's objectives and FNS requirements, and that it will be satisfactory to the recipients, retailers, and financial institutions that participate in the FSP.

As discussed in Section 1.4, there are several basic models for an on-line EBT system, including the independent model, the integrated food stamp-only model, the multi-program model, and the integrated EBT/POS model. Each of these models has inherent advantages, limitations and challenges. FNS chose the independent on-line model as the most feasible and suitable approach for the original EBT system. The operational feasibility of an EBT system was at issue, and it was important to isolate the EBT system. PDPW chose an integrated food stamp-only system as the most cost-effective model that was feasible, given the time frame and the need to accommodate the existing POS terminals.

The principal choice for a State that decides to establish an integrated on-line EBT system is between a food stamp-only system and a multi-program system. A food stamp-only EBT system could be linked with other assistance programs in a multi-program system after implementation. Choosing a multi-program system at the outset will expand the scope of the design effort, because the requirements of the other programs need to be incorporated. However, development costs for a multi-program system (especially costs for developing generic system components, such as transaction authorization) can be spread over several funding sources. While some design issues pertaining to multi-program systems are noted in this chapter, the focus is on designing an EBT system for the FSP.

One possible variant of the integrated food stamp-only model is a combination EBT/coupon system. In such a system, recipients could make purchases electronically or convert their benefits into coupons. Stores could either be equipped with EBT terminals or continue to process all redemptions via coupons.

Although an EBT/coupon system could eliminate some of the cost of equipping retailers to process EBT transactions, it would not eliminate the use of food stamp coupons -- a major reason for implementing an EBT system. In addition, given the choice, recipients apprehensive about EBT operations might convert all of their benefits into coupons, making the EBT/coupon system less efficient than an on-line coupon issuance system. (It should be noted, however, that surveys of Reading recipients who have used both coupons and the EBT system indicate a strong preference for the latter.)[1]

An EBT/coupon system would require the use of automated coupon dispensers (ACDs) to avoid the cost of issuance agents (the most expensive element of the conventional coupon-based issuance system). ACDs present technical problems, especially if the coupons are to be issued in books, as they are at present. A FNS-sponsored assessment of the feasibility of ACDs and other off-line EBT technologies concluded that a combined POS/ACD system probably would be more expensive to operate than a "pure POS" system -- by up to $2 per case month.[2] The study also noted that no currently existing ACD device would meet the specifications required for FSP use. For these reasons, considerable doubt exists as to whether an EBT/coupon approach is viable.

CHOOSING IN-HOUSE VERSUS CONTRACTED OPERATION

The State must decide whether State staff or a contractor will operate the EBT system. If an EBT system is to be integrated with other data processing operations, one approach is to run it on the State's current data processing facility, which may be run by the State or a vendor. This approach

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[1]Hamilton et al., op. cit., p. 182.

[2]Coenen et al., op. cit., pp. 101-168.

will maximize the State's control over EBT system operations, but it is only feasible if the facility has the necessary equipment to support an EBT system (as PDPW's did) or if at least some of the additional equipment required by the EBT system can be shared with other State applications.

The alternative approach to running an integrated EBT system is to contract with a vendor with a suitable computer system. This approach would minimize up-front investment in computer equipment. However, a vendor that only operated the State's EBT system -- especially a pilot-scale, food stamp-only system -- might not have enough of a stake in the system's success to be sufficiently reliable. A separate contract for an integrated EBT/POS system would be more viable, since the vendor could augment State fees with revenue from commercial POS sources.

SELECTING THE EBT SYSTEM SERVICE AREA

Along with the basic system model, a State must choose the area that the EBT system will ultimately serve. The choice of an EBT system service area is an important factor in determining capacity requirements and other design parameters. The design team should consider whether there are areas of the state in which an EBT system would be inefficient to implement and operate. For example, the cost of equipping stores in rural areas to process EBT transactions might be high in proportion to the savings in issuance and redemption costs and losses, because the fixed cost of deploying terminals would be spread over relatively few cases.

Unless the planned long-run service area is quite small, the design team may want to designate a pilot area for initial EBT system implementation. The pilot area should be small enough that project staff will be able to closely monitor EBT system implementation and operations. A modestly sized pilot area will ensure that implementation costs are not more than the State is willing to risk, and that the State can fall back to the previous issuance system without serious disruption. Under the FNS guidelines for unsolicited EBT demonstrations, the pilot area must be smaller than the State, unless a Statewide demonstration can be justified as necessary to ensure a cost-effective test.

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information.[1] The desired capacity and processing speed of the EBT system are particularly important factors in many design decisions, such as the choice of processors. The requirements for integration with existing State program operations also should be considered early in the design process.

The way in which a State formulates general functional specifications and other design requirements for an EBT system may vary, depending on the State's strategy for system development. A State that plans to purchase a system from a vendor might only need to create relatively general specifications as a basis for soliciting and evaluating proposals, allowing the vendors flexibility in formulating more specific designs. However, a more detailed set of specifications would provide such a State with greater assurance that the EBT system will operate as desired by the State. A State planning an in-house development effort (or a collaboration with a vendor) might prefer to move directly from the basic system model to the detailed specifications of system functions, performance, and other requirements.

3.3 DEFINING THE SYSTEM'S FUNCTIONAL REQUIREMENTS

Before detailed design work can begin, the exact functional requirements of the system need to be defined. This task involves taking the general requirements for what the EBT system must do and expanding them to address specific State objectives, policy decisions, and program operating procedures at the State and local levels.

The functional requirements for EBT systems fall into five general categories:

- authorizing access to benefits,
- providing benefits to recipients,
- crediting retailers and financial institutions for benefits redeemed,

[1] Guidelines for establishing performance standards for food stamp EBT systems are discussed in John A. Kirlin, Performance Standards for Electronic Benefit Transfer Systems, Cambridge, MA: Abt Associates Inc., September 1987.

- reconciling benefit flows and producing management reports, and
- managing retailer participation.

Each category is discussed below. When discussing alternative State options for meeting these requirements, the text points out their potential implications for system development, implementation, and operation.

FUNCTIONAL REQUIREMENTS: AUTHORIZING ACCESS TO BENEFITS

An EBT system needs to perform the following functions to ensure that benefits are issued in the correct amount to eligible households:

- interact with household certification,
- interact with FSP Household Master File and Issuance Authorization File,
- issue ID cards and benefit access devices,
- verify recipient identity,
- initialize cards and accounts,
- train recipients to use the system,
- authorize and post benefits to recipient accounts,
- provide benefit information to recipients, and
- track accountable documents.

Interact with Household Certification. Recipients participating in an EBT system must be certified in accordance with FSP regulations, just like recipients in a conventional coupon issuance system. The State's certification process need not change with the implementation of an EBT system. An EBT system, however, will have an impact on related activities that occur during the certification process, such as issuing the food stamp identity card, as discussed below, and possibly the entry of household data (if additional items are required by the EBT system).

Interact with FSP Files. Program regulations require that certified households be recorded in a Household Master File and an Issuance Authorization File. Some States have separate food stamp data bases; others have

integrated FSP data into their client information systems for AFDC and other assistance programs. Although an EBT system can be separate from the Household Master File and the Issuance Authorization File, as in the PDPW system, the system will depend on the availability of an automated recipient data base to produce the EBT recipient account file and allotment files.

The State will need to construct a software interface between its recipient data base and the EBT system. At a minimum, this interface must be capable of extracting data on new accounts and allotments from the FSP files, formatting the data for use by the EBT system, receiving activity and reconciliation data back from the EBT system, and re-formatting and transferring these data to the recipient data base. The interface also needs to link the EBT system with the State's accounting systems so that State requirements for auditability and control of benefit dollars can be met.

The complexity of the interface design will depend on the structures of the existing State data bases and on the other design features that shape the EBT system's data base structure. For example, the interface will be more complex if the EBT system allows more than one card access to a household's benefits. Specific interface issues are discussed later in this section in the context of design requirements for issuance and reconciliation functions.

An EBT system could be more closely linked to the client information system than in the PDPW system. For example, a new case opening could automatically create an EBT account via an on-line transaction (instead of an overnight batch process), so that the client could be issued a card and trained during the certification visit. An on-line interface also could allow access from State computer terminals (instead of special EBT system terminals) to the EBT data base for inquiries or even holds on lost or stolen cards.

Such interactions would complicate EBT system development, given the unique design of many certification systems. The more an EBT system is to be linked to the State's existing data processing systems, the more difficult and expensive it will be to adapt available POS software. PDPW explicitly chose not to link its EBT system to its certification system for this reason. The operational advantages of a more sophisticated interface might, however, outweigh the additional design and development costs.

Issue ID Cards and Benefit Access Devices. All food stamp recipients must be issued cards that identify them as eligible to receive and redeem food stamp benefits. In coupon-based issuance systems, recipients use ID cards when they pick up coupons at an issuance point and when they redeem the coupons (if requested by the retailer). The ID must contain the name and signature of the person to whom the benefits for the household are issued, as well as any other authorized representatives. In areas designated by FNS, a serialized, laminated photo ID must be issued. The food stamp ID is usually issued during the certification visit or mailed to the recipient with the notice of certification.

An EBT system requires the use of a magnetic-stripe card or other benefit access device to activate the terminal at the point of sale. PDPW issues a food stamp photo ID with a magnetic stripe embedded in the laminating pouch as the benefit access card. While FNS did not require photo IDs in Reading before the EBT demonstration, the photo card was selected to provide a preliminary security check in any EBT transaction. An added advantage of this card design was that it required only minor changes to the photo ID cards and equipment already in use in parts of Pennsylvania.

A separate access card could be issued in addition to the food stamp ID, if desired, as is done in some on-line coupon issuance systems. The primary advantage of this method is that the access card could be designed specifically for EBT use, while the separate food stamp ID would satisfy program requirements. The need to place a laminated photograph and a signature on the access card could otherwise force the State to choose a card that was incompatible with industry standards or otherwise less desirable. (Conventional photo IDs such as the one used by PDPW generally do not meet POS industry standards.) FNS considers the access card and the PIN as sufficient proof of authorization to redeem benefits, however, so a second ID would need to be issued only if the State requires it (e.g., as proof of identity for issuance of an EBT card, if this function is performed separately).

While POS systems typically employ magnetic stripe cards, the benefit access device could employ another technology, such as the integrated circuit ("smart") card or the optical memory ("laser") card. These card technologies offer a greater capacity for information, an important consideration in designing a multi-program system. However, these cards are more

expensive than magnetic stripe cards, as is the equipment to encode them and read them. FNS issued a request for proposals to test the suitability of these technologies for an operational EBT system; this demonstration is planned to begin in late 1989.

A State designing an EBT system should devote attention to the benefit card configuration. The financial services industry has set detailed standards for magnetic-stripe cards. While an integrated EBT system would not be bound by these standards, the use of a standardized card would have a number of advantages. The system could use a wider range of card reading and encoding devices. In the long run, an EBT system that meets industry standards will be easier to link with commercial POS systems. Using a standard POS card might entail higher implementation costs, however, especially if the State already has equipment to produce photo ID cards that can carry a magnetic stripe.

Another design issue is how to designate authorized representatives other than the person to whom the EBT card is issued. In an EBT system, the card must be used every time a food stamp purchase is made. Households need to be able to designate "alternate shoppers" in case the primary recipient is unable to go to the store due to illness or other reasons.

In the PDPW EBT system, the household receives a paper "alternate shopper card" when the regular benefit card is issued. When a person other than the individual named on the benefit card shops, he or she presents the alternate shopper card along with the benefit card and the PIN. The benefit card could simply list the names of authorized users, or each authorized user could receive his or her own card and PIN (just as a couple with a joint bank account receives two automatic teller machine cards). This last option would increase the complexity of the programming and add to card issuance costs, but it would eliminate the need for compromising security by sharing the PIN.

How and when benefit cards will be issued is an important consideration in designing an EBT system. Issuing benefit cards is one of the major areas of activity during implementation of an EBT system and during ongoing system operations. This function is also critical to system security, since the card provides direct access to food stamp benefits. Among the questions that the State should address are:

- Will benefit cards be issued locally or centrally?

Food stamp ID cards are usually issued at the local welfare office in conjunction with certification. In the PDPW EBT system, cards are issued by clerical staff at the County Assistance Office in Reading. Central card issuance requires extra steps, such as mailing the card to the local office or the recipient, that add costs and potential points of vulnerability. Depending on the technology used, central card issuance may provide economies of scale and an extra step to prevent abuse by local employees. Some banks use centralized, automated card production systems to cut the cost of issuing debit cards and separate card issuance from account creation. A large project area may need to automate EBT card production to keep pace with the flow of new cases; this may require sharing of equipment among local offices, at least within a county or metropolitan area.

- How will card issuance be made secure against external and internal attempts at fraud?

The card issuance process should be designed so that employees with the ability to authorize benefit issuance cannot create and encode benefit cards. The physical production of the card should be separated from the encoding of the card unless other comparable protections are provided. In the PDPW system, a caseworker certifies the recipient as eligible, a clerk enters the data on the eligibility system, another clerk takes the photograph and laminates the signed card, and still another clerk encodes the benefit card. Other security features used in the PDPW system include password-restricted access to the terminal used in card encoding and automatic logging of the worker ID for each card encoded.

In the PRC system, card encoding was "on-line": the data necessary to activate the card were transmitted electronically from the workstation to the encoder. For technical reasons, PDPW switched to an off-line encoding process in which the operator retrieves the card number and other data from the terminal and enters the data onto the card via the encoder keyboard. (The workstation used in the PDPW system was not capable of interfacing with the card encoder.) This change makes it easier to create a duplicate of the recipient's card, but controls on access to the blank cards and photo equipment offset this risk.

- How will expedited service requirements be met?

The State needs the capability to issue EBT cards to households qualifying for expedited service within the time frame specified by FNS regulations. Such households must be issued benefits or an ATP card no more than five calendar days after the date of application, and (if an ATP is issued) must have a reasonable opportunity to redeem the ATP within the same period. This requirement may make it difficult to centralize card issuance, unless an alternative method is available for expedited cases (such as a temporary card that can be issued by the local office). PDPW meets the expedited service requirement by issuing cards locally and making training available five days a week.

- How and under what circumstances will cards be replaced?

Because recipients cannot use their benefits without an operational benefit card, the card issuance process must permit prompt replacement of lost, stolen and damaged cards. As in the case of expedited service, this requirement is most easily met by locally based card issuance. The EBT system should also provide the capability to lock out a lost or stolen card, to prevent unauthorized use. In the PDPW system, recipients can call 24 hours a day to have a lost or stolen card put on hold. Replacements for lost, stolen or damaged cards are issued by the end of the next working day. The PDPW system permits cards to be reencoded if necessary, reducing the number of more costly replacements.

In areas where the risks of fraud are high, a State might wish to add an expiration date to the card. While this provision would increase program operating costs, it could reduce the risk of unauthorized use of unreported lost or stolen cards.

Verify Recipient Identity. The EBT system must provide a mechanism for verifying that the person presenting the EBT card is entitled to use it. In the PDPW EBT system (and most commercial automatic teller machines and POS systems), each cardholder has a secret personal identification number (PIN). The cardholder enters the PIN on a keypad attached to the terminal as an "electronic signature" authorizing the purchase or other transaction. The terminal compares the PIN entered with the PIN offset (a number encoded on the card which is derived from the card number and the PIN through a standard

algorithm). If the PIN is correct, the terminal submits the transaction to the central processor.

While the PIN could be assigned by the EBT system, experience from the Reading demonstration has shown that recipients have little problem remembering their PINs when they make the selection. (When the user selects the PIN, he or she can choose an easy-to-remember number or set of letters with personal significance.) The PIN must be selected before card encoding can be completed, so the card production process must allow adequate time for this step. If cards are produced centrally, it may be necessary to allow PIN selection at the training site to avoid delays.

The PIN selection mechanism should prevent unauthorized persons from knowing a recipient's PIN. The best protection is to have the recipient enter the PIN directly into the encoding device on a shielded keypad. In the PDPW system, the worker who encodes the card enters the PIN. The system compensates for the risk entailed in this procedure by automatically recording the identity of the worker who encodes the card.

Assignment of the PIN by the system avoids the problems of coordinating PIN selection with card production and lessens the risk of an unauthorized person guessing the PIN from information on the card (e.g. because the PIN is part of the user's name or case number). However, the possible problems of recall with system-assigned PINs are likely to create more burdens for recipient service workers.

The PIN method is not the only possible verification method for an EBT system, but it is the most practical one at present. Other identity verification technologies digitize some identifying feature, such as a photograph, fingerprint, or signature pattern, and encode it on the card. These data generally require more space than the PIN offset, and may exceed the data storage capacity of the card. The POS terminal must be equipped to collect the data (e.g. with a special signature pad) and compare them to the data on the card. This equipment is substantially more expensive than terminals equipped for PIN verification, with costs ranging up to $1,000 per terminal.[1] The PIN has another advantage over the other verification measures: the cardholder can transfer it to other authorized users.

[1]Coenen et al., op. cit., p. 89.

Initialize Cards and Accounts. The EBT system must set up a record for each recipient account and each card issued with access to that account. These records will be used by the system to process and record transactions. The EBT system must also permit the updating of account and card records, as needed.

The PDPW EBT system creates a new recipient account when the recipient's first benefit allotment is transmitted from the State's certification system. (This process is described on page 47.) The recipient returns to the welfare office to select his or her PIN and receive the benefit card. When the worker retrieves the system-assigned card number and enters the PIN via the Tandem terminal, a record of the card data is created and the account becomes active. The worker also enters the recipient's language preference for telephone balance inquiries. Authorized PDPW staff can change the name, address, language preference, account status (new, active, lost, or hold), and account type (regular recipient, test, training or investigative). All changes to recipient accounts are automatically logged in a file maintenance history.

Other integrated EBT systems could initialize cards and accounts in different ways. Some of the possibilities are:

- Recipient accounts could be created as a result of certification, instead of at the first issuance. This would permit card encoding at the time of certification. An alternative procedure for entering existing cases would be required. This approach could produce accounts to which no benefits were ever issued, a drain on system resources.

- Account activation could be triggered automatically by on-line PIN selection. This alternative would reduce the effort required to open a case, but it would require a workstation and card encoder at each training site.

- Changes to recipient data in the State's client information system could automatically update the EBT recipient account. This alternative could be attractive for a large-scale system, but it would increase the complexity and cost of EBT system implementation because of the interface requirements entailed.

Train Recipients to Use the System. Recipients in coupon-based issuance systems typically receive only brief instruction in how to obtain and redeem benefits. Formal training is not necessary, because these activities resemble familiar transactions, such a cashing a check or using currency. Food stamp recipients are generally less familiar with making transactions electronically, so the EBT system must train them to make purchases and keep track of their benefit balances.

Recipient training should be coordinated with card issuance, so that recipients can practice using their own cards and PINs. In Reading, BCAO staff show an instructional video and demonstrate card use while recipients' cards are being encoded. Once they receive their cards, the recipients practice transactions on specially programmed training terminals. If cards are produced centrally, training should occur after recipients have picked them up or received them in the mail. (Mailing out benefit cards may not be advisable because of the need for training as well as security considerations.)

- Authorize and Post Benefits. Like any food stamp issuance system, the EBT system must provide for the authorization of benefit delivery. This process begins with the certification of household eligibility and calculation of the benefit amount. These data are input to the Master Household Issuance Record file and used to produce listings of authorized monthly and non-recurring allotments. In coupon-based issuance systems, the listings of authorized allotments are used to print Authorization-to-Participate cards (ATPs) or to prepare coupon mailings. Benefit issuance systems must meet FNS requirements for the timeliness of regular and expedited issuances, so that recipients get their benefits when expected.

An EBT system is subject to the same basic standards of authorization, accuracy and timeliness as coupon-based systems. PDPW uses the listings of authorized issuances produced for printing ATPs as the input for the EBT benefit posting process. Issuance records for EBT participants are extracted from the issuance files for the county, using a special identifier inserted in the participating household's Master File record at the time of certification. The EBT benefit issuance data are transferred by tape to the computer that maintains the EBT recipient accounts. The EBT issuance program adds the issuance to the current account balance or, if the recipient has no account,

creates a new account record. Monthly issuances files are produced in advance and loaded on the evening before the day on which the recipient would be scheduled to receive an ATP. Expedited, supplemental, and prorated issuances are posted on the same evening that they are authorized by the eligibility system.

The accuracy and reliability of benefit issuance in an EBT system are especially important, because they affect not only the recipients but the retailers as well. If benefits are not posted on schedule, because of operator error or a system failure, recipients may not find out until they are already at the checkout counter. When this type of problem occurred during the operation of the PRC system, it caused long checkout lines and serious retailer dissatisfaction. Similarly, recipients will base their purchases on their expected allotments, so it is important to ensure that the amounts are correct.

A State designing an EBT system might wish to link benefit posting more closely to the household issuance master file than in the PDPW system. While it is simpler and less risky to modify existing issuance processes, a process that transmits allotment data directly from the master file to the EBT client file might be more efficient and reliable in the long run. The separation of issuance file generation from benefit updating in the PDPW system entails additional effort and some risk that the update will not be run at the proper time. Streamlining the benefit updating process might be especially desirable if statewide EBT operations are planned. In addition, a benefit issuance process that minimizes operator intervention will reduce the risk of tampering with the issuance file.

Aside from the added costs and risks of issuance delays entailed in a modification to the existing process of generating allotment listings, this approach may not be desirable for scheduling reasons. The best time to generate allotment listings may not be the point in the monthly cycle when benefits should be posted. The scheduling problem is especially important during the transition from coupon issuance to EBT issuance, since most coupon-based systems must generate allotment listings several days in advance to allow for mailing.

An EBT system needs a capability to adjust allotments for a variety of reasons. The State must have the capability to recoup losses from

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Provide Benefit Information to Recipients. An EBT system should provide ways for recipients to obtain their benefit balances without making purchases. This requirement ensures that recipients can plan their food purchases. In addition, it enables recipients to detect any problems with their allotments before attempting a purchase -- a valuable feature from recipients' and retailers' perspectives.

The PDPW EBT system provides balance information in several ways. The most frequently used method of tracking the balance (according to recipient surveys) is the printed receipt from each purchase, which shows the remaining balance as well as the purchase amount. In addition, a recipient can call the system on a telephone (tone service is required), enter his or her case number and PIN, and hear the balance in English or Spanish (as selected at the time of training). Special terminals for balance inquiries are located in high-volume stores. The terminals at the checkout counters also permit balance inquiries.

Track Accountable Documents. FNS requirements govern the handling of documents that could be used to establish an account, issue benefits, or redeem benefits. These accountable documents vary from one issuance system to another, but they include certification documents, blank ID cards, blank ATPs, and food stamp coupons. Accountable documents must be securely stored, and inventory records must be maintained to document the flow of accountable documents. An EBT issuance system eliminates some accountable documents, such as ATPs and coupons. Blank ID cards (and transaction cards, if separate) need to be securely stored and properly inventoried.

FUNCTIONAL REQUIREMENTS: PROVIDING BENEFITS TO RECIPIENTS

Providing benefits to recipients is the second of the five major categories of functions an EBT system must support, and it is the category which differs most from the coupon system. Functions included in this category are:

- verify recipient identity,
- process purchase transactions,
- process refunds and other adjustments,
- support manually authorized transactions,

- convert EBT benefits to coupons,
- deliver food benefits, and
- provide receipts and access to balance information.

Verify Recipient Identity. The previous section discussed using PINs or other identification procedures to verify a recipient's identity because PIN selection must be coordinated with card issuance and training -- functions which are part of the process of authorizing access to benefits. Actual verification, however, occurs at the point of sale when recipients use EBT benefits to buy groceries. Verification is needed to ensure that unauthorized individuals do not use lost or stolen benefit cards to access a recipient's benefits.

Using a PIN to verify identity requires some means of entering the PIN and reading the encoded strip on the ID or transaction card. In the PDPW system, this function is performed by a dial-up Benefit Transaction Terminal (BTT) with an attached PIN pad. Firmware in the terminal and system software check that the account and PIN offset are valid before processing a transaction.

The PDPW system has a number of advantageous features that other States should consider. The terminal is independent from the cash register, so it can be used in any store. The terminal is programmed to verify the PIN before submitting the transaction. Thus, the total number of messages processed by the EBT computer is less than if every PIN entry were submitted for validation. The terminal programming permits three PIN entry errors before denying the transaction, striking a balance between ease of use and security. The system permits a total of nine PIN entry errors in a day before locking out the account for the day. The separate PIN pad provides a more secure means of PIN entry than the terminal keyboard. Validation of the account number and PIN offset by the central computer guards against attempts to use lost, stolen, or counterfeit cards that pass the PIN check at the terminal.

Process Purchase Transactions. The central function of an EBT system is the processing of purchase transactions in which program benefits are exchanged for food. In an on-line EBT system, the purchase transaction

begins when the recipient presents the EBT card to the clerk, who swipes the card through the reader on the BTT. After PIN entry and validation, the clerk enters the purchase amount and submits the transaction. The BTT sends a transaction request to the central processor via telephone.

The central processor must verify that the transaction originates from an authorized store and that the purchaser has a valid, active account. Next, the processor must check for sufficient benefits in the account to pay for the purchase and accept or reject the purchase. If it accepts the purchase, it must debit the recipient's account and log a credit for the retailer. Finally, the central processor must send a confirmation message to the BTT.

To permit recipients to use their benefits, a State operating an integrated EBT system needs to deploy and maintain a network of POS terminals. A number of issues that should be considered in designing this network are discussed below.

An EBT system should be designed to minimize disruption to the shopping patterns and options of recipients. Thus, the general criterion in a "EBT-only" system should be to include all types of authorized food retailers in the EBT network. There may be some types of retailers for whom alternative transaction procedures need to be developed, because of technical obstacles or cost-effectiveness considerations. Route vendors, farmers' markets, and other food retailers who lack permanent establishments may not have access to telephone lines and thus be unable to process transactions on-line. The State may also wish to consider providing alternative transaction procedures for stores with very low food stamp sales volumes (such as those on the fringe of the project area) on the grounds that installing and maintaining a terminal in such a store is not cost-effective.

The main option for an alternative transaction procedure in an EBT system is the manual authorization procedure used in the PDPW system. This procedure and its limitations are discussed on pages 56 to 59.

The requirement to maintain recipients' access to established shopping options also raises the issue of when the EBT system must be available to process transactions. In many areas, authorized retailers may be open 24 hours a day, so the EBT system must provide access to benefits at all

times. From the perspective of recipients and retailers, it is preferable to keep the EBT system available for electronic purchases 24 hours a day, as FNS did in specifying the requirements for the PRC EBT system. This choice complicates the design of the database backup and system reconciliation, because the system must remain "up" during these procedures. The increased processing requirements that result add to the cost of operating the sytem.

The other option is to specify certain hours as "down time" and use alternative purchase procedures during those hours. Late-night purchases may be vital in some cases (as when a baby needs formula), but they tend to be relatively infrequent. In the original Reading demonstration, less than 5 percent of purchases occurred between 10 p.m. and 8 a.m.[1] However, the staffing requirements to handle these additional manual authorizations might offset the savings from shutting down access to the computers.

The deployment of the network of EBT terminals must also satisfy FNS requirements for equal treatment of food stamp recipients by grocers. This requirement prohibits the establishment of separate lanes for EBT sales. The approach in the Reading demonstrations has been to equip virtually all checkout counters. Other States may wish to adopt a targetted terminal deployment strategy to hold down costs. For example, stores with multiple checkout counters may direct EBT sales to those counters which currently accept other non-cash payment methods, such as checks or commercial debit cards. This strategy would reduce the number of checkout counters which must be equipped with EBT terminals, without singling out or discriminating against food stamp recipients. If the number of terminals is limited, the State will need a plan for allocating them among stores, taking into account factors such as the number of checkout lanes, monthly redemption volume, and the extent to which the issuance schedule will cause peaks in the demand for access to the system.

Another issue in the deployment of the terminal network for an EBT system is the retailers' role. In Reading, retailers bear none of the costs of equipment, supplies and telephone service (except for a few low-volume

[1]Susan H. Bartlett and Margaret M. Hart, Food Stamp Recipients' Patterns of Benefit Redemption. Cambridge, Massachusetts: Abt Associates, Inc., (forthcoming), p. 22.

retailers who provide the telephone lines and receive reimbursement for message unit charges). By law, retailers cannot be required to pay any costs associated with alternate issuance systems, such as EBT.

One important possibility for an expanded retailer role in deploying the terminal network is to take advantage of POS equipment and communications systems already in use, even in stores that are not part of commercial POS systems. In some stores, the electronic cash registers could function as the terminals if equipped with a PIN pad (and, if necessary, a card reader). Communications between the checkout counter terminal and the EBT computer could be routed through back-room minicomputers currently used for linking the chain stores with their parent firms' headquarters. In stores equipped with electronic package scanners, the EBT system could be linked to the scanner so that the purchase amount would be automatically determined by the total of food-stamp eligible items computed by the scanner.

The EBT system would have to be compatible with commercial POS technology in order to accept purchases processed through existing store equipment. The system design would have to be "open" with respect to the device originating the transaction. This was one of the design enhancements that PDPW sought, because the PRC system had been designed around a particular terminal with special, non-standard programming. Even an EBT system that is compatible with the standards of commercial debit card networks may be difficult and costly to link with the diverse hardware in the stores. Proprietary data needed to make these links may be difficult to obtain from equipment vendors and retail chains. The extent to which stores have the POS equipment needed should be considered before devoting a great deal of design and development effort to this option. Furthermore, retailers may require that the FSP pay for the use of their equipment.

The use of retailers' telephone lines may be desirable as a way to limit costs, but it poses a number of problems. Retailers in the original Reading demonstration who used their own lines for EBT communications found that the conflict between uses made it difficult to conduct business. This problem was usually solved by installing a separate EBT line, which was paid for by the demonstration. Some retailers with measured telephone service objected to paying message units for calls from their BTTs. FNS agreed to reimburse these retailers for this expense; PDPW assumed this responsibility

when it took over the EBT demonstration. Finally, the lack of touch-tone service at some store locations slowed communications between the BTT and the computer.

To protect recipient accounts against unauthorized access, data transmissions between stores and the EBT computer should be protected. If the PIN is transmitted, it should first be encrypted. In the PDPW EBT system, an encrypted PIN is not sent. Instead, the PIN offset encoded on the transaction card is transmitted. In addition, transaction messages include a Transaction Authorization Code (TAC) computed by the BTT from the other data in the message. The EBT processor computes the TAC from the data received and compares it to the TAC transmitted by the BTT. The transaction is rejected if the two TACs do not match (e.g., because of a garbled transmission).

Another security issue is limiting system access to authorized persons. The EBT system must have an up-to-date file of participating retailers in order to determine that a purchase originates from an authorized store. Access to store terminals should be limited to authorized personnel. Each transaction should be tagged with identifying information, such as a clerk ID, terminal ID and store number.

The PDPW EBT system accomplishes these functions through the BTT sign-on operation. Each store manager is issued a magnetic-stripe card (like the recipient's benefit card) which must be passed through the card reader to begin the sign-on function. The store manager also selects a PIN, which must be entered at sign-on. Each store clerk enters an assigned two-digit ID on the BTT at sign-on or when starting a shift. In addition to the store ID (from the store card) and the clerk ID, the BTT's memory contains a unique terminal ID. All of these data are included in transaction messages and verified against the system files before a transaction is authorized.

Process Refunds and Other Adjustments. An EBT system must provide a mechanism for retailers to issue refunds to recipients. A refund may be necessary when a clerk overcharges a recipient or when a recipient returns eligible food items. A refund is processed in essentially the same way as a purchase in the PDPW EBT system: after a PIN check, the amount of the refund is entered on the BTT and the transaction is submitted. If the refund passes the validity checks, the system credits the recipient's balance and debits the retailer's balance. As an additional security feature, the store's EBT card

must be swiped through the BTT and the store's PIN must be entered before a refund can be submitted.

An EBT system may need the capability to reverse a transaction under certain circumstances. The PRC EBT system automatically generated a "refund" to the recipient when the BTT "timed out" (i.e., when the BTT cancelled a transaction because the system did not reply within a programmed time interval). This refund cancelled any debit processing that had already occurred. The PDPW EBT system has a similar process that is separately identified as a reversal in system reports and log files.

If the retailer is unaware that a transaction has been reversed, he or she might allow a recipient to take groceries out of the store without payment and suffer a loss. This situation has occurred with the PDPW EBT system when retailers failed to detect reversals, attributing the lack of a receipt on printer malfunctions. For this reason, an EBT system should be designed to minimize the occurrence of transaction reversals and to process them so as to be evident to the retailer.

An EBT system must also provide an adjustment mechanism for those errors which cannot be corrected by a purchase or a refund. No EBT system will be 100 percent accurate in processing transactions; there will always be a few situations in which the system correctly debits one account but incorrectly credits another, or vice versa.

As in the case of issuance errors, the mechanism for correcting transaction processing errors should protect against unauthorized access and tampering by authorized personnel. In the PDPW system, access to the adjustment function is restricted to the highest level of system security. An automated audit trail for account adjustments is planned. Another security feature for this function might require a second staff member to enter a password, providing an identifiable witness (as is done in the destruction of food stamp coupons).

Support Manually Authorized Transactions. An EBT system needs back-up purchase procedures to permit legitimate benefit use when electronic purchases are not possible. Situations requiring the use of such back-up procedures include store equipment failure, system unavailability due to maintenance or malfunction, and retailers without access to a telephone at the

point of sale. An EBT system should be designed to minimize the use of back-up procedures (e.g., by duplication of processing hardware and databases), but some non-routine transactions will be necessary under any EBT design. The back-up procedure must provide protection against overdrafts, unauthorized use of a recipient's benefits, and redemptions by unauthorized retailers. Manually authorized transactions should be well documented and auditable.

The PDPW EBT system has a special function for manual authorization of sales by EBT staff. There is a FNS-mandated limit of $35 per recipient per day for such sales. The clerk calls the EBT "hotline" (a special number programmed into the BTT, which connects the caller to EBT staff) after performing a PIN check (if possible). The clerk gives the store's ID, his or her ID, the recipient's case number (printed on the card) and the amount of the purchase.

The hotline worker enters this information on the system (if it is up). If the data are valid and the recipient has sufficient benefits, the system records a "manual debit" against the recipient's available balance and produces an authorization number. (If the system is down, the EBT worker checks the most recent daily reconciliation report, which shows the recipient's balance. The worker enters the manual debit on the EBT system as soon as the system is available. This procedure carries some risk of an overdraft if the recipient has made a purchase since the report was run.) The clerk records the purchase information on a manual sale slip (which resembles a credit card slip), and the recipient signs the slip.

The store submits one copy of the three-part slip to the EBT Center, gives one copy to the recipient, and keeps a copy. When the EBT Center receives the manual sale slip, a worker enters the data on the computer and "reconciles" the manual debit. This function credits the retailer for the manually authorized purchase.

In the PDPW system, retailers who are equipped with BTTs may use the manual authorization procedure when the store's equipment is malfunctioning or the system is unavailable to process electronic transactions. PDPW also permits newly authorized retailers to process sales manually before their BTTs are installed, if the delay would cause inconvenience for recipients (e.g. when a popular store changes ownership). Route vendors and some sellers at farmers' markets call in their sales when they have access to a telephone, usually after the sale. Retailers who do not obtain authorization before

making an EBT sale bear the risk of overdrafts, but this is not a widespread problem in Reading because a very small proportion of benefits (about .01 percent) are redeemed through this method.

The back-up purchase procedure used in the PRC and PDPW EBT systems has a number of limitations. Retailers object to the time and effort required (especially if a system outage causes many retailers to attempt to make manual sales at the same time) and the $35 daily limit, which may force a recipient to return the majority of his or her planned purchases. The uncertain time lag between the sale and the credit makes it difficult for retailers to reconcile sales and deposits. Some retailers reportedly avoided the manual sale procedure by holding the recipient's card and PIN until an electronic purchase could be processed, or by filling out a manual sale slip and processing a routine purchase the next time the recipient came into the store. (These actions violate FNS regulations, which prohibit the extension of credit to recipients by retailers.) The PDPW system design has addressed some of the problems with the manual sale procedure by providing a retailer deposit inquiry capability and speeding up the manual sale function. That is, whereas the PRC system required the worker to look up data on several screens before authorizing a manual sale, the PDPW system uses a single workscreen.

Another feature has become an issue with the extension of the demonstration: once a manual debit is placed, it remains on the data base until it is reconciled. If the retailer fails to submit a copy of the sales slip, the manual debit remains on the data base indefinitely. When the PDPW EBT system replaced the PRC system, several thousand dollars in outstanding manual debits had to be transferred to the new database. Observations of retailer operations have indicated that retailers sometimes request a manual sale and then obtain credit at a later time by having the recipient authorize a regular purchase. In this situation, the manual debit is never reconciled. Other manual debits remain unreconciled because of lost sales slips. Over an even longer period, the accumulation of outstanding manual debits could burden system storage capacity. Designers of EBT systems that plan to use similar procedures should consider providing a report on "aged" debits that remain unreconciled for a long time (e.g., two months), so that retailers can be asked to submit slips or notify the system operator that the debit should be voided.

Some States might consider using a manual authorization procedure for stores at the fringe of the area served by the EBT system. Such an arrangement might require setting a limit on a store's monthly manual sales, so that these transactions would not overburden EBT staff. Any manual authorization procedure, especially one that is used as the routine purchase procedure for some retailers, should be designed with attention to the potential impacts on operating costs, staffing, and system integrity.

Convert EBT Benefits to Coupons. Certain circumstances may require an EBT system to convert electronically stored benefits into coupons. In the PDPW system, recipients leaving the EBT project area can request that BCAO issue an ATP to convert their remaining benefits into coupons. A special EBT system function permits a BCAO worker to reduce the recipient's balance to zero before issuing the ATP, preventing a duplicate issuance. To protect system integrity, this function can be performed only by designated staff and must be authorized by the recipient through a PIN entry.

Deliver Food Benefits. In most cases, benefit delivery in an EBT system will be the direct result of an electronic transaction at the point of sale. The merchant accepts the credit from the EBT system in exchange for the food selected by the recipient. As in the coupon system, the merchant may only accept program benefits in exchange for eligible food items.

An EBT system needs to accommodate those recipients who are allowed to redeem their food stamp benefits through residential facilities, meal delivery programs, or restaurants. Although such persons have been exempted from participating in the Reading EBT system, this approach might not be feasible in a larger project area where the coupon delivery mechanism might be eliminated. One alternative for residential programs would be a standing written authorization from the recipient for a monthly transfer of funds. Meal delivery programs and restaurants could use manual sale authorization procedures, although this approach would work only if the volume of such transactions were low. (Meal delivery programs would have to call in for authorization before serving the meal, to ensure the availability of benefits.)

Provide Receipts and Access to Balance Information. An EBT system should provide the recipient with a receipt for each purchase. Because recipients do not physically hold their benefits in the form of coupons, the

receipt is necessary as a permanent record of benefit use. The receipt also provides confirmation that the transaction amount equals the cash register total for the groceries. In the PDPW EBT system, the information on the receipt includes the following:

- date and time of purchase,
- terminal, clerk, and store ID,
- transaction amount,
- remaining balance in recipient's account,
- recipient's case number, and
- type of transaction (i.e., purchase or refund).

An EBT system should provide the client with information on his or her remaining balance at the point of sale. The simplest and most reliable way to provide the remaining balance is by printing it on the receipt, as the PRC and PDPW systems do. As noted earlier, the receipt was the most commonly used method of tracking balances in the original Reading EBT demonstration. During the designing of the PRC system, the concern was raised that printing balance information on the receipt might violate clients' privacy. This problem was avoided by designing the receipt so that it contained only the client's case number, not the name or other identifying information.

The PDPW EBT system also provides recipients with other means of access to benefit information at the point of sale. A recipient can make a balance inquiry from the BTT to check his or her account before attempting a purchase. When the system rejects an attempted purchase because the balance is less than the purchase amount, the terminal displays the difference. While these means of benefit information are useful to recipients, they increase the accessibility of the same information to store employees. This information alone is not a major threat, but a store employee is also in a good position to learn a recipient's PIN and gain access to his or her benefit card.

FUNCTIONAL REQUIREMENTS: CREDITING RETAILERS AND FINANCIAL INSTITUTIONS

The third major category of EBT functions is crediting retailers and financial institutions for benefits redeemed. This crediting is typically performed via an electronic fund transfer through the Federal Reserve's Automated Clearing House (ACH) network. Six separate tasks are involved:

- verify retailers' bank account information,
- total retailers' EBT credits,
- prepare an ACH file,
- transmit the ACH file to a clearinghouse institution,
- transfer funds to retailers' bank accounts, and
- provide deposit information to retailers.

Verify Retailers' Bank Account Information. The EBT system's retailer file needs to contain accurate, up-to-date information on each retailer's bank account, so that credits can be transferred properly. The necessary data include the name and American Banking Association (ABA) number of the retailer's bank, the account number, and the type of account. These data must be collected from each retailer upon entry into the EBT system, and the retailer record must be updated whenever account data change. The EBT system must provide a means for EBT staff to enter the data and update the file. This data entry mechanism should be efficient and secure from unauthorized access.

In the PDPW EBT system, a retailer completes a standard Automated Clearing House (ACH) authorization form containing the account data before the store is placed on the EBT system. An EBT worker enters the data (via the EBT workstation) as part of the process of setting up the retailer's account on the system. The data entry function also permits the worker to update the account data. As with all EBT workstation functions, access to the system to create or modify retailer accounts is restricted to authorized employees by security controls, and all such activity is automatically logged in a maintenance file. The EBT system uses the account data in the retailer's file record in creating the ACH transfer file.

This approach relies on the store to notify the State of any change in account data. If the store fails to do so, the ACH will reject transfers, causing delays in credits to the store. EBT workers must investigate these rejected transfers, correct the account data, and arrange for the store to receive credit (typically via a check from the clearinghouse interface bank). In a large-scale EBT system, this responsibility might become

burdensome. To avoid a high rate of rejections by the ACH, the EBT system might arrange for automatic notification of account changes from retailers' banks. The need for retailer consent for transfers to a new account might complicate this solution.

Total Retailers' EBT Credits. An EBT system has to record a credit for each transaction processed by a participating retailer. This record provides the basis for several system functions, including funds transfers to retailers, reconciliation, and activity reports. Transaction data must be recorded centrally to permit retailer crediting and reconciliation, but they can also be recorded at the point of sale to provide retailers with immediate information.

The PDPW EBT system records transaction data centrally and at the point of sale. The purchase transaction creates records in the system's

retailer and terminal files. The printer that provides the recipient's receipt also writes the same information on a journal tape, which can be compared to the cash register tape. In addition, the terminal accumulates a transaction total and prints it out when signed off.

An EBT system must total or "bundle-up" each retailer's transactions in preparation for initiating the transfer of credits to retailers' bank accounts. The bundle-up total for each retailer should include routine purchases and reconciled manual sales, less any refunds or other adjustments. The system should maintain a running total for each retailer and compare it to the computed total as a check against processing errors or tampering.

The bundle-up process is a major batch processing function of an EBT system because of its importance to retailers and its demand on system resources. In the PDPW system, transaction data are transferred from the Tandem minicomputer to a Unisys mainframe that is more capable of handling the bundle-up processing requirements.

The timing of the bundle-up process is important for a number of reasons. The institution that sends the retailer credits through the ACH

system settlement to be as congruent as possible with their own cycle of cash drawer settlement. If the same processor handles individual purchases and bundle-up, performing bundle-up during the peak shopping period could slow down transaction processing.

In the PRC system, the timing of bundle-up created several problems. To minimize the delay between purchases and retailer credits while meeting the processing deadline set by the clearinghouse interface bank, the EBT system bundled up all retailer credits as of 2 p.m. each business day. This schedule meant that the bundle-up program ran in the mid-afternoon, competing for system capacity when shopping activity was rising to its daily peak. Many retailers found it difficult to reconcile their EBT transfers with their cash register data, since the 2 p.m. cutoff came in the middle of the business day or shift. Indeed, this was the most widespread and persistent complaint about the PRC system.[1]

One of the design objectives for the PDPW system was to resolve these problems with the bundle-up process. The separation of bundle-up and other-batch functions from on-line transaction processing eliminated the competition for system resources. To facilitate retailers' reconciliation of EBT sales, the PDPW system design also provides two alternatives to the standard 2 p.m. cutoff (although neither alternative has yet been implemented). First, a retailer can specify up to four settlement times in advance, to coincide with shift changes or other times when cash drawers are totalled. Second, if the retailer wants to change the settlement time from day to day, the system can be instructed to treat the terminal sign-on time as the start of a new business day. Either of these options will increase the delay in receiving credit for some purchases, but they will reduce the effort devoted to reconciling EBT sales.

A simpler solution to the problem of timing bundle-up might be to set the standard cut-off at the end of a normal business day (e.g., midnight). A system using this approach would be easier to develop, implement, and operate than one with multiple settlement options. Retailers as a group, however, might prefer to have more than one settlement option, given the diversity in their operating schedules and reconciliation procedures.

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[1]Hamilton et al., op. cit., p. 118.

An EBT system does not necessarily have to perform bundle-up every day; credits cannot be submitted to the ACH on weekends and holidays. The PRC system performed bundle-up only on banking days. This approach reduced staffing requirements on weekends and holidays, but it meant that retailers received deposits covering as much as four days' sales, increasing the retailers' reconciliation problems. The PDPW system performs bundle-up every day; tapes produced on weekends and holidays are held in secure storage and submitted the next banking day. Retailers' monthly bank statements show EBT deposits for each day, facilitating their reconciliation process.

Prepare an ACH File. Once an EBT system has bundled up the day's retailer credits, it must format the credit records as specified by the National Automated Clearinghouse Association (NACHA) and assemble them on a tape or other medium. The records are then transferred to a clearinghouse institution for entry into the ACH. This function requires the use of retailer bank account data, as discussed previously. The medium in which the data are contained (tape, cartridge, diskette or other format) and other requirements may be dictated by the clearinghouse institution to ensure compatibility with its ACH processing system. The system designers should clarify these requirements with the clearinghouse institution early in the design phase.

The ACH must be notified of a new or changed retailer account 10 business days before transfers to that account are submitted. An EBT system must provide a mechanism to suspend deposits to a retailer that is in this "pre-notification" status. This process must ensure that the retailer is properly credited for all transactions (including manual sales, refunds and overrides) at the end of the pre-notification period.

An EBT system should protect against processing errors or tampering with the ACH tape by checking the data on the tape against other system data. The PDPW system provides a check between the running retailer total maintained by the on-line portion of the system and the retailer credit on the ACH tape (as reflected in a printout of the tape file). The lack of a similar mechanism in the PRC system allowed incorrect ACH credits to go unnoticed until after they had been transmitted.

Transmit the ACH File. An EBT system can gain access to the ACH only through an ACH member institution or the Federal Reserve. This

clearinghouse institution replaces the individual retailers' banks as the intermediary between the retailer and the Federal Reserve in the benefit redemption process. The clearinghouse institution might hold some retailers' accounts, as did American Bank and Trust in the PRC system, or it might serve solely as the ACH interface, as does Commonwealth National Bank in the PDPW system. Designers of an EBT system should, if possible, select the clearinghouse institution early in the project to ensure a smooth interface between the EBT system and the ACH. If this is not possible (e.g., because of competitive procurement requirements), the system designers should consult with the regional ACH or member banks.

An EBT system can transmit ACH credit data to the clearinghouse institution physically or electronically. A physical medium, such as a tape, requires less coordination between the EBT system and the bank than an electronic link. For a small pilot project such as the Reading demonstrations, the complexity and cost of establishing a secure, high-speed data link between two computer systems might not be justified. Instead, PDPW uses a bonded courier to deliver the ACH tape from the State's computer center to the clearinghouse institution, ensuring safe and timely arrival.

For a long-term, large-scale EBT system, an electronic link to the clearinghouse institution might be more appropriate. This approach would reduce the risk of delay or interception in the transfer of ACH credit data. An electronic link would be faster, providing more time to prepare the ACH file and making it easier to replace the file if errors are found. If the computer center is distant from the clearinghouse institution, electronic transfer might be the only practical method. The use of a physical medium for the transfer of ACH data during the early stage of EBT system implementation would not, of course, preclude later conversion to electronic transfer.

Transfer Funds to Retailers' Bank Accounts. In an EBT system, the final steps in the process of benefit redemption are the transfer of funds to retailers' accounts and the reimbursement of the clearinghouse institution for funds advanced. These steps can be accomplished by the clearinghouse institution and the Federal Reserve through existing electronic funds transfer procedures. While no changes to these procedures are necessary, they form part of the overall EBT system design.

The clearinghouse institution begins the funds transfer by merging EBT credits with other interbank transactions for transmission to the ACH. If the clearinghouse institution holds the accounts of EBT system retailers, it may credit them directly (as AB&T did). The clearinghouse institution transmits its complete ACH file electronically to the ACH processor (the Federal Reserve Branch Bank). The FRB branch sorts the ACH entries by destination bank, sends them on electronically (or by other means, if the bank does not have an electronic link), and debits the reserve account of the sending institution to offset the transfers. Banks usually transmit entries to the ACH in the late afternoon or early evening; the receiving bank credits the retailer's account on the next banking day.

The clearinghouse institution normally can transmit the EBT credits during the day or night processing period. Day processing in the ACH is less expensive, but night processing permits later bundle-up and more time to resolve any problems with the ACH tape. The timing of bundle-up and ACH tape production must be based on a choice between day and night processing. However, it may be possible to shift EBT transmissions from one period to the other if necessary, as was done to ease the bundle-up crunch in the original Reading demonstration.

The EBT system must provide a procedure for transferring funds from the USDA's Treasury account to reimburse the clearinghouse institution for debits to its reserve account. This procedure takes the place of the debiting of USDA by the Federal Reserve in exchange for benefits redeemed through banks' deposits of food stamp coupons. In the PDPW system, CNB makes a wire funds request each business day to the New York FRB against the Letter of Credit (LOC) for the demonstration. Unlike most demonstrations, the EBT project has an automatic approval for drawdowns against the LOC. FNS funds the LOC each month and monitors the drawdowns on a daily basis.

In both the PRC and PDPW systems, the lack of an automatic link between the retailer credits and the wire funds transfer has led to occasional errors in wire funds requests. These errors are sometimes compounded by efforts to correct them in subsequent draw-downs. To the greatest extent possible, the agreement between the EBT system operator and the clearinghouse institution should mandate a procedural or programmed link to ensure accurate draw-downs.

Provide Deposit Information to Retailers. An EBT system needs to provide deposit information to retailers so they can track their sales and reconcile them against their cash drawers. The level of need for EBT deposit information varies among retailers, but many stores require daily information. Retailers cannot rely solely on totals accumulated at the point of sale (by journal tapes or terminal memory) for a variety of reasons, including the inconvenience of signing off terminals at the system's cut-off time, as well as the possibility of processing discrepancies or errors in the data recorded by the terminal. Also, retailers may not know when manual sales clear because of delays in mail and processing by EBT workers. In the original Reading demonstration, the clearinghouse institution called a few high-volume stores with daily deposit totals to overcome this problem.

The PDPW system provides retailer deposit information through the same Voice Information Processing System (VIPS) that supports recipients' telephone balance inquiries. The retailer (or a chain's accountant) can call the VIPS from any touch-tone telephone, enter the store's PIN, and hear the most recent bundle-up total. This system does have some limitations, such as the need for a touch-tone telephone, the lack of hard-copy, and the need to call daily to capture data before the next update. However, PDPW's approach was easier to develop and less expensive than alternatives, such as on-line access to account data for stores or printing out deposit data on store terminals. Providing periodic EBT activity statements to retailers also would be useful, but would not address the need for daily deposit information.

FUNCTIONAL REQUIREMENTS: BENEFIT RECONCILIATION AND MANAGEMENT REPORT PRODUCTION

The fourth major category of system functions is benefit reconciliation and management report production. It includes functions which:

- reconcile posted benefits to the Issuance Authorization File,
- reconcile recipient accounts,
- reconcile retailer accounts,
- reconcile flows of benefits through the system,
- verify retailer credits against ACH deposits,

- transmit retailer deposit information to FNS,
- provide management reports, and
- maintain audit trails.

The design of an EBT system should devote considerable attention to how it will reconcile benefit flows and produce management reports. These functions are crucial to the operating efficiency and integrity of the EBT system. They should be designed to produce easy-to-interpret, reliable reports and to facilitate diagnosis and resolution of problems. Reconciliation and reporting may also represent major demands on the system's processing capacity. Thus, the design of these functions must balance the desire for information with the cost of producing it.

EBT system planners should think through how the design of each reconciliation function interacts with other functions, including bundle-up and benefit posting. An EBT system design should provide for a manageable daily batch processing cycle. The design should permit batch programs to run at times that minimize competition for system resources with unscheduled, on-line functions, such as purchases and card encoding. On occasion, the execution of batch operations in the PRC system interfered with card encoding at BCAO, causing difficulties for recipients and staff.

Reconcile Posted Benefits to the Issuance Authorization File. An EBT system must reconcile the benefits posted to recipient accounts to the records of authorized benefits in the Issuance Authorization File (IAF). This reconciliation is necessary to detect processing errors or intentional alteration of the allotment file. The comparison provides the basis for required reporting to FNS on benefit obligations, issuance losses, and program participation.

In the PDPW EBT system, the process that creates the allotment file writes a record of the authorized issuance in the IAF. The EBT benefit posting function creates an acknowledgement file in the same format as the file produced when PDPW reads in data from cancelled ATP's. EBT issuances are then reconciled to the IAF through the same process as ATP issuances. This process identifies any discrepancies between authorized and actual issuances, and updates the IAF by indicating that the issuance was received. (An

allotment posted to an active EBT account is considered by FNS as equivalent to coupons delivered to a recipient.)

The above reconciliation process permits the State to include issuances to EBT participants in its existing issuance reporting system. That reporting system was designed around a different set of problems (e.g., lost, stolen, and counterfeit ATP's, etc.) than those faced in EBT benefit issuance. Thus, a different approach may be desirable for a long-term, large-scale EBT system. Such a reconciliation system would focus more on the possibility of tampering with the allotment file and on the status of outstanding recipient balances. For example, the total amount of benefits posted could be compared to a report based on IAF data showing the amount of benefits currently authorized. When designing the issuance reconciliation process for an EBT system, a State should nonetheless take into account the interface with its existing reconciliation system during EBT system phase-in.

The procedure for converting EBT system benefits into coupons may require modifications to the State's existing issuance reconciliation process. In the PDPW EBT system, benefits that are to be converted into coupons must be issued a second time. (A BCAO worker authorizes an issuance of an ATP to the recipient in the amount of the remaining balance on the EBT system. Because the original issuance posted to the EBT system has already been recorded as a "transacted ATP," this process creates an apparent duplicate issuance which does not fit into any of the categories in the standard reporting system. The only evidence that the issuance is not in error is the record of the "zeroing out" of the benefits on the EBT system maintained at the local welfare office.) This reconciliation procedure is adequate for the Reading demonstration, but a more structured reconciliation mechanism would be needed in a larger system with more frequent benefit conversions.

Reconcile Recipient Accounts. An EBT system must reconcile individual recipient account balances against account activity on a daily basis. This function protects against and detects overdrafts, processing errors, and tampering with recipient accounts from inside or outside the EBT system. Reconciliation of the system totals is not sufficient, because offsetting errors could leave the system as a whole on balance. To reconcile recipient accounts, the EBT system must bring forward the recipient's reconciled balance for the previous day, add any increments during the day (issuances, refunds or

adjustments), and subtract any decrements (purchases, adjustments, or conversion of benefits). If the result of this operation equals the current balance in the client account, the account is reconciled.

The design of the recipient account reconciliation function may be complicated by manually authorized sales and other special EBT system functions. Commercial POS software, such as the package used as the basis for the PDPW EBT system, may not provide for some of these functions and, thus, may require a substantial redesign of the reconciliation process. For example, manual sales in the PDPW system must be handled differently from routine purchases: the purchase must be deducted from the recipient's available balance, but the benefits are not credited to the retailer until the manual debit is reconciled.

Careful design of the recipient account reconciliation process is important to ensure that real account discrepancies can be detected and understood while false indications of discrepancies do not cause confusion and wasted effort. The reports should be designed to reflect all possibilities. For example, the report should be capable of representing a negative balance situation (e.g., when a manual debit is posted as less than the actual purchase, causing an overdraft when the debit is reconciled). Reconciliation reports should be easily understood by users, and discrepancies should be highlighted for action by separate "exception" reports. Possible types of discrepancies should be identified in advance, and procedures for investigating and resolving such discrepancies should be specified.

Reconcile Retailer Accounts. Each day, an EBT system must reconcile each retail store's transactions to the deposits it will receive. This reconciliation protects the stores and the EBT system by detecting processing errors and intentional manipulation of retailer accounts.

To reconcile a retailer's account, the EBT system must sum up the store's daily increments (purchases, reconciled manual debits, and adjustments), subtract decrements (refunds, overrides, and adjustments), and compare the net result to the day's deposit. Retailer reconciliation differs from recipient account reconciliation in that the retailer's balance of credits is normally exhausted by the daily deposit, so the balance should be zero. However, a retailer may have a negative balance (if refunds and other decrements exceed increments), which the reconciliation process must carry forward

to the next day. Manually authorized sales and holds on deposits (e.g., for retailers in ACH pre-notification status) may require special handling in the retailer reconciliation process.

Reconcile Flows of Funds Through the EBT System. An EBT system should reconcile the funds flowing into and out of the system with the funds remaining in the system. It should also reconcile the flow of funds out of recipient accounts with the flow of funds to retailers. This overall system reconciliation is important because it confirms the amount of funds for which the system (and the State that operates it) is responsible. The funds in the system represent outstanding FNS obligations and also the overall exposure to potential losses. System reconciliation may detect processing errors or tampering that does not affect any individual account, or errors in the reconciliation of individual accounts. Conversely, the reconciliation of individual accounts may point out errors in system reconciliation.

An EBT system must perform several comparisons to reconcile the flow of funds. Flows into the system (issuances, account adjustments, and refunds in excess of sales) must be compared with flows out of the system (ACH credits, conversion of benefits to coupons, and account adjustments). The difference between these totals must be compared with the sum of recipient balances and other funds in the system, such as outstanding manual debits and deposits on hold. Recipient and retailer accounts should be balanced in the aggregate by comparing funds flows in and out with balance totals. If a separate pool of inactive recipient accounts is maintained, the balance in this pool should be compared with the difference between funds transferred in (from the active account section) and funds transferred out (to active accounts or coupon conversion) or returned to FNS. System reconciliation should be performed on a daily basis and on some cumulative basis, such as the "life-to-date" reconciliation performed by the PDPW system.

Given the large sum of benefits residing on an EBT system at any time, it is particularly important that the reports reconciling the flow of funds through the EBT system be reliable, easy to understand, and useful in identifying the source of a discrepancy and its solution. The design of the original EBT system did not always meet these criteria. A time-consuming and error-prone 23-step manual process was needed to compile the necessary data from various reports. (PDPW eliminating this problem by automating the

process.) Some features of the system were not handled properly: for example, conversions of benefits to coupons were not recognized after the day they occurred, so that the affected accounts showed apparent discrepancies (even though the balances were correct).

PDPW initially experienced a similar problem when its reconciliation reports truncated some totals because the field sizes were not large enough. This and other problems with PDPW's reconciliation reports (such as the lack of a total value for outstanding manual debits) were corrected in time, but the resolution of these problems and the daily reconciliation in the interim required much effort by PDPW staff.

Verify Retailer Credits Against ACH Deposits. An EBT system must verify that retailers receive the correct reimbursement for EBT sales by comparing totalled retailer credits with ACH deposits. These figures might differ because of processing errors by the EBT system or the clearinghouse institution, or because of tampering with the ACH tape. Thus, reconciliation of retailer credits against ACH deposits protects both retailers and the FSP.

Some of the data required for complete verification of ACH deposits do not exist within the EBT system. The amounts of the ACH deposits transmitted must be obtained from the clearinghouse institution. The amounts of the actual ACH deposits received by the retailers are available only from the retailers or their banks.

The PDPW EBT system produces a weekly tape of retailer credit data for the FNS Minneapolis Computer Support Center (MCSC). FNS also receives bundle-up totals over the telephone each day. FNS compares the retailer credit data with draw-downs on the LOC by the clearinghouse institution. Discrepancies between these figures usually result from errors in the draw-down, such as a clerical error in the manual process of preparing the wire-funds transfer request. During the original demonstration period, the EBT system tape occasionally had errors or could not be read, complicating the reconciliation process. The LOC reconciliation process can also identify errors in the ACH deposits.

The ACH deposit reconciliation performed in the PDPW EBT system may not identify errors involving individual retailers (such as a deposit to the wrong account). However, retailers can use the deposit information function

to check their actual deposits against the transfers authorized by the EBT system. In another EBT system, retailers might receive a periodic statement of deposits to reconcile against their own bank statements. The clearinghouse institution is obligated by the ACH to maintain records of all ACH entries. Copies of these records for EBT deposits could be transmitted routinely or on demand.

Transmit Retailer Deposit Information to FNS. An EBT system must transmit information on retailer deposits to FNS. FNS requires this information to reconcile the LOC activity, as described in the preceding section. Furthermore, the EBT system must provide retailer redemption information to replace the data normally provided through Redemption Certificates submitted by retailers with their coupon deposits. FNS needs these redemption data to monitor retailer participation in the FSP.

This function will be governed by the processing requirements of the MCSC. The redemption tape function should be designed to mirror the ACH deposit files submitted to the clearinghouse institution. The PDPW EBT system produces a redemption data tape each week, just as the Federal Reserve branches send the Redemption Certificates and other redemption documents to MCSC on a weekly basis.

Produce Management Reports. An EBT system needs to produce reports on system activity for a number of management uses. Data on recipient and retailer activity are needed for participation and performance reports to FNS. Furthermore, well-designed management reports can assist system administrators in monitoring the level of service, responding to problems, and planning system enhancements. Finally, management reports should facilitate evaluation of the pilot EBT system by the State and FNS, as discussed in Chapter 6.

The requirements for management reports shift over the life-cycle of an EBT system. During system implementation and early operations, the EBT system should provide managers with reports that highlight problems with system use or performance. These reports should test the assumptions of the system design by permitting comparisons with actual patterns of use (such as overall purchase volume and peak loads). Similarly, performance reports should show how well the system operates in terms of the performance goals or standards specified in the system design. In later stages of EBT system

operation, reports should reflect trends in system use and performance to help administrators plan enhancements or expansion of capacity.

The management reporting sub-system for an EBT system should be flexible, so that reports can be adapted to managers' needs. Aside from the changes in orientation over time, managers may discover unanticipated data needs as they become more familiar with an EBT system. (This is less likely if the EBT report software has been adapted from a POS package that is already in wide use.) POS software designers must build in the capability to produce a wide variety of management reports for different applications.

Management reports should make clear and meaningful comparisons. For example, a report of purchases by day might begin with the first issuance day of the month (instead of the first calendar day), so that month-to-month comparisons would be more interpretable. The use of summary tables and graphs can enhance the impact and usefulness of the management reports. If management reports can be produced in a machine-readable form, users will be able to manipulate the data to facilitate analysis.

The areas of activity covered by the PDPW EBT system management reports include:

- client allotments,
- client benefit usage,
- approved purchases,
- unsuccessful balance inquiries,
- non-approved transactions, and
- refunds and system reversals.

These reports include summaries by such categories as language of recipient, type of store, and reason code. Logs of trouble calls from recipients and retailers, manual sales, and system problems also are prepared to assist system management and to comply with FNS requirements.

Maintain Audit Trails. An EBT system needs to maintain audit trails of all activity for which the State is accountable, including benefit issuance, retention of recipient balances, removal of benefits, and authorization of transfers to retailers. These data can be used for many purposes,

including resolving disputes about recipient charges and addressing problems identified during system reconciliation. Any function that exposes the EBT system to fraud or abuse (including card issuance, client account initialization, retailer account initialization, manually authorized sales, and removal of benefits for storage or conversion) should be adequately (and, if possible, automatically) documented so as to identify those responsible.

The PDPW EBT system provides audit trails in several ways. A worker must sign on a workstation with an ID and a password to perform sensitive functions such as card issuance. The system automatically records the worker ID when it executes the function. Each transaction (including purchases, other POS activity, and workstation functions) is recorded in a history file. The PDPW system provides numerous functions to recall (and print, if desired) such history data, including detailed client and retailer histories.

EBT workers maintain a paper log of all manually authorized purchases, including those that could not be entered at the time of sale due to system inaccessability. Account adjustments and benefit removal for conversion to coupons are documented by printing out relevant account history screens. A similar procedure is used to document benefit use for client fraud cases, since the benefit posting process does not produce a signed document as evidence of receipt of benefits.

One issue in designing audit trail processes is how long to maintain data on-line. As long as data are maintained in on-line storage, they are readily available. However, the on-line storage capacity of any system is limited, and on-line storage is more expensive than storage on tape or hard copy. In addressing this issue, EBT system designers should consider the likely uses of audit trail data, because some data (e.g., issuance records) are more critical than others. The PDPW system solves this dilemma by permitting history files to remain on-line until it is necessary to purge them (e.g., because of limited disk space). PDPW plans to maintain at least 60 days' data on line, but the system administrator can designate any number of months as the retention period before the file is automatically purged.

FUNCTIONAL REQUIREMENTS: MANAGING RETAILER PARTICIPATION

The fifth and last major category of system functions is managing retailer participation, which includes such tasks as:

- receiving FNS information on retailer authorization,
- equipping and supplying participating stores,
- maintaining store equipment,
- training store employees, and
- permitting compliance investigations.

These functions place a State in a new role with respect to benefit issuance and redemption. With an EBT system, the State helps FNS manage retailer participation in the FSP. The EBT system design, therefore, must provide for smooth interfaces with retailers and FNS to execute these retailer management responsibilities. Unlike other functional areas, the management of retailer participation requires activities that occur outside the familiar domain of local welfare offices and the State data processing center.

To maintain retailer participation in the EBT system, the EBT system design must take into account the nature of the retail environment. Retail food stores operate on hours determined by customer demand, and the EBT system must be responsive to that same demand. Retailers operate on narrow profit margins, so they are concerned about any EBT system feature that adds to their costs, especially in the area of checkout productivity. Within the constraint of guaranteeing equal treatment, the EBT system design should seek to minimize negative impacts on non-food stamp customers, such as checkout delays caused by malfunctioning EBT terminals.

In the PDPW EBT system, the primary point of interaction for the management of retailer participation is the hotline. Retailers deal with the hotline from the time they first request entry into the EBT system. All day-to-day retailer needs, including equipment service, other technical problems, questions about transactions, and manual sales, can be addressed by calling the hotline. Through this interaction, hotline staff establish a rapport with the retailers that is helpful in maintaining their cooperation.

Receive Information from FNS on Retailer Authorization. As in any FSP redemption system, the EBT system must ensure that retailers can redeem program benefits only if they have received authorization from FNS. To meet this requirement, the EBT system must have an interface with the FNS Field Offices responsible for retailer authorization in the project area. This interface permits the exchange of information when a retailer is authorized and when a retailer loses authorization voluntarily or through disqualification. This communication needs to be prompt and reliable because of the importance of retailer authorization and retailers' need for prompt access to the EBT system upon authorization.

In the PDPW EBT system, a retailer wishing to enter the EBT system is referred to the FNS Field Office (FO) for authorization. The EBT hotline sends a form to notify the FO of the referral, so that the FO knows that the retailer will be participating in the EBT system. If the store is already authorized, the FO sends a confirmation form to PDPW; if not, the store must apply for and receive authorization before confirmation by the FO. The FO also provides the FNS retailer authorization number, which is entered in the new retailer's file record to permit coordination with the FNS retailer data base.

Communication between the EBT system and the FO becomes especially important when a retailer leaves the FSP or is disqualified. In Reading, the hotline notifies the FO if it learns that a store is giving up its authorization. The FO is responsible for notifying the EBT hotline in advance of store disqualifications, to ensure that the store's account will be locked out from further transactions at the proper time. Depending on the length of the disqualification, the store account may be simply put on hold until notification by FNS, or the account may be purged.

An EBT system must rely on outside sources, such as the store or the clearinghouse institution, for notification that a retailer has voluntarily ceased participation in the FSP. To protect against vulnerabilities created by disuse of active EBT accounts (such as use by an unauthorized retailer), the PDPW system locks out a retailer account after two consecutive months in which the retailer has processed no transactions. If a retailer fails to notify the EBT system of a change of ownership, the situation might not be detected unless ACH deposits are rejected by the former owner's bank (or the

new owner complains of not getting credit). Having the hotline based in the project area (as in the PDPW system) provides an added means of tracking changes in ownership.

Equip and Supply Participating Stores. The provision of equipment and supplies to retailers is a major responsibility in an EBT system. Stores need terminals, printers and special supplies (such as manual transaction slips) to process sales; recipients cannot shop where they choose unless the stores are equipped. The inventory of equipment is valuable, and it must be controlled to prevent unauthorized access to the system. Thus, the deployment of equipment and supplies should be managed with care, and equipment should be removed promptly from stores that are no longer authorized. While most stores are equipped during system implementation, normal turnover and growth make this an ongoing responsibility.

Equipping stores and deinstalling equipment for an EBT system requires the availability of technically qualified staff with ready access to the area served by the EBT system. A State may not have such a capability or wish to hire staff for this purpose (as PRC did), but it may have an existing contractor with the necessary capability. In Reading, PDPW uses the same contractor that installs and services computer terminals at the local assistance office. Another option, which might be more economical, is to utilize firms that install and service commercial POS terminals. Finally, some stores might choose to take responsibility for installing the equipment themselves.

In addition to installing the terminals and printers, there are other steps required to prepare a store to participate in an EBT system. The installation of extra telephone lines may be required, necessitating advance coordination with a telephone company. An inventory of store equipment installed must be maintained to ensure retailer accountability for the equipment and to provide data for system control files. If the store provides equipment, it must be tested for compatibility and identified for the system files.

Retailers participating in an EBT system need supplies, such as special forms (e.g., manual sales slips) and spare paper and ribbon for the printer. If the EBT system provides the equipment, it probably will have to provide supplies as well. If so, the State needs a plan for resupplying retailers after stocks delivered at the time of installation are used up.

Possible options include mail delivery, pickup of supplies by the retailer (e.g., at the local welfare office), and delivery of supplies by equipment maintenance personnel or other EBT staff. These options present various trade-offs between retailer convenience and cost to the EBT system.

Maintain Store Equipment. An EBT system cannot properly serve recipients unless the store equipment is maintained in working order. If equipment malfunctions, retailers may lose sales from disappointed food stamp customers and other customers annoyed by lengthening checkout lines.

Maintaining store equipment can be an expensive function: in Reading, the cost is $20 per terminal/printer set per month. Thus, the question of who pays for maintenance is important to both the State and the retailers. If retailers can use the terminals for other transactions (as in an EBT/POS system), they might be willing to contribute to maintenance costs. However, FSP legislation states that retailers cannot be required to pay any costs associated with alternate Food Stamp Program issuance systems. Thus, it is unlikely that retailers would share costs in an EBT system that was not linked to a POS system. To reduce maintenance costs, retailers can be trained to trouble-shoot and resolve simple problems (such as loose telephone connections), as PDPW has done.

The frequency and cost of maintenance are important considerations when choosing terminals and printers for an EBT system. A more expensive unit may save money in the long run if it is more reliable -- and it may also serve retailers and recipients better. On the other hand, some units may be so inexpensive when purchased in large quantities that they are cheaper to replace than repair. A low-cost unit would also permit a strategy of providing a back-up terminal for each one installed and requiring the retailer to replace and return the faulty one for repair. This approach would save the cost of on-site maintenance.

The maintenance arrangement for EBT store equipment should accommodate the operating hours of participating stores. Twenty-four hour maintenance availability is likely to be expensive, so stores open when maintenance is unavailable could be provided with at least two terminals in case one fails. The PDPW EBT system does this and also permits manually authorized sales when store equipment is awaiting maintenance.

Train Store Employees. Store employees must be trained to perform EBT transactions, including routine purchases, refunds, balance checks, and manually authorized sales. This training is necessary to ensure that recipients can use their benefits. In addition, training ensures that stores will follow proper procedures to protect system security. Finally, store managers need instruction on how to perform their special functions, such as authorizing refunds and reconciling EBT deposits with their sales records.

Training should be performed before a new store begins to process EBT purchases. Training for new employees in existing stores also should be available. The training should provide an overview of how the system operates, explain all retailer functions in detail, and enable the employee to diagnose simple equipment problems. In the PDPW system, EBT hotline staff cover all of these topics in on-site, individualized training sessions. (Training procedures used during system implementation are discussed in Chapter 6.)

The EBT system should permit hands-on training, preferably through the use of special retailer and recipient accounts so that system reports will not be adversely affected. The PDPW system provides these features and a training mode on the BTT that permits simulated transactions without actual transmissions.

Permit Compliance Investigations. Agents of the FNS Compliance Branch conduct undercover investigations of stores suspected of violating redemption regulations. These compliance investigations require the agent to attempt prohibited transactions with food stamp benefits, such as buying cigarettes or exchanging benefits for cash.

An EBT system presents an obstacle to compliance investigations, because the investigator must have a legitimate ID and a system account with benefits. The EBT system must be capable of providing these resources without jeopardizing the integrity of the system or the confidentiality of the investigation. In addition, an EBT system must flag transactions made by an investigator to provide evidence for administrative or criminal action if violations occur.

Under PDPW's procedures, a senior staff member is designated to provide the investigator with the ID and the account. The system software has

a separate account category for investigations, which permits the necessary reporting and reconciliation.

3.4 SPECIFYING OTHER SYSTEM DESIGN REQUIREMENTS

A number of important design issues cut across all major categories of EBT system functions to shape how well the system operates. These issues include:

- What level of capacity must the EBT system have to serve the planned pilot area? What are the long-run capacity requirements for the system?
- What are the programmatic and technical requirements for the EBT system to fit successfully into the existing environment of FSP operations?
- What performance standards must the system meet? How can the design ensure that these standards will be met initially and over the long run?
- What configuration of hardware, telecommunications facilities, and software will best meet the requirements established for the EBT system?

A general design for an EBT system should address these issues. It is particularly important for system designers to recognize the interactions among these requirements. For example, the options to meet performance standards may be constrained by the need for compatibility between the EBT system and other data processing facilities.

This section discusses the design issues outlined above, bringing to bear relevant data and experience from the Reading EBT demonstrations.

PLANNING EBT SYSTEM CAPACITY

An EBT system must have sufficient capacity to perform its functions efficiently and in accordance with performance standards. System capacity must be adequate to serve the caseload in the project area at the time of implementation. More capacity is needed if the project area caseload grows, or if the area served is expanded.

Measures of System Capacity. Three elements affect the capacity of an EBT system: communications capacity, processing throughput, and file capacity.

The communications capacity of an EBT system is the number of calls it can receive at one time from transaction terminals and other sources. Thus, sufficient communications capacity is necessary to ensure that incoming calls rarely encounter busy signals. Otherwise, purchase transactions must be resubmitted, slowing checkout counters and creating longer lines. The communications capacity can also effect the productivity of local welfare office staff, who must make connection with the system to perform card encoding and other functions.

The processing throughput of an EBT system is the number of transactions it can process in a standard unit of time, such as a minute. Processing throughput determines the maximum load of transactions that an EBT system can handle. If the incoming volume exceeds the throughput, the lines will tie up, and purchases will not go through. As with communications capacity, the processing throughput affects the productivity of all workers who interact with the EBT system and the level of service to recipients.

The file capacity of an EBT system is the amount of data it can store, including recipient and retailer account records and transaction histories. If a system file reaches capacity, the system will no longer be able to process the functions that require adding data to that file. In the short run, it may be possible (though time-consuming) to reorganize files to accommodate more data, but an inadequately sized system may eventually reach the physical limits of the storage devices. As system files approach capacity, they can slow the processing of purchases and of batch functions that require access to large numbers of records.

Estimating Capacity Requirements. To ensure that the communications capacity, processing throughput and file capacity of an EBT system will be adequate, system designers must first estimate the total demand to be placed on the system. Since the FSP operates on a monthly cycle, it is appropriate to estimate demand in terms of monthly activity. Purchases will be the primary source of demand: in the original Reading system, they made up 76

percent of all transactions.[1] The projections must also include demands from benefit posting, account initialization and maintenance activity, and other transactions.

The total number of purchases per month in an EBT system can be projected on the basis of the number of households participating and the expected average number of purchases per household. The former item can be estimated from food stamp caseload data, with proper allowance for any excluded groups.

The number of purchases per household is more difficult to estimate, because the only available data on food stamp purchase rates are those produced by the Reading demonstration. In a survey conducted to assist the designing of the PRC EBT system, recipients indicated that they made an average of five food stamp purchases per month. This proved to be a substantial underestimate: the actual average in Reading is about eight food stamp purchases per month. About a third of the households make three or fewer purchases each month, while eight percent make 20 or more. The underestimate of purchase volume was a significant factor behind a number of capacity problems in the PRC system.

System designers may want to consider collecting data on recipients' purchase patterns before making assumptions about total purchase volume. For instance, a sample of recipients could be asked to maintain logs of purchases, to avoid the natural tendency to underestimate purchase activity. Another potential source of data on recipient purchase patterns is participating retailers, but the Reading experience showed that they too tend to underestimate the rate of purchase activity.

For States which lack the resources to collect their own purchase activity data, the Reading purchase data can serve as a guide because they permit separate estimates of purchase rates for different recipient groups. The data show that the number of purchases is directly related to the size of the allotment. In addition, purchase rates are higher for small households,

[1]This and other data on transaction activity are discussed in several reports from the original evaluation of the Reading EBT demonstration, including: John A. Kirlin and William L. Hamilton, Performance Issues in an Electronic Benefit Transfer System for the Food Stamp Program. Cambridge, MA: Abt Associates Inc., (February, 1987) and Bartlett and Hart, op. cit..

male-headed households, and households headed by a person over 50 years old. Differences in allotment size and demographics were estimated to have a potential effect of up to 10 percent (i.e., plus or minus 0.8 purchases) on the average monthly purchases per household.[1]

The number of non-purchase transactions per month will be determined in part by the functions the system performs. In an "EBT-only" system, benefit posting will be the most frequent non-purchase transaction: each active case will receive at least one allotment, and additional allotments will be posted for new cases and those requiring supplemental benefits. Each case opening or closing will require one or more transactions, depending on the system design. (The PDPW system requires four separate transactions to open and fund an account). The rate of case openings and closings will depend on the rate of case turnover. Other transactions that the system must accommodate include balance inquiries, unsuccessful purchases, refunds, manually authorized purchases, and conversion of benefits. During the original Reading demonstration, non-purchase transactions averaged 2.6 per active household per month.

A State's policy on the conversion of EBT benefits to coupons will have an impact on the number of non-purchase transactions. In Reading, conversion is allowed only if the recipient is leaving the demonstration area for a substantial period, so this activity is relatively rare (about 20 transactions per month). If conversion is permitted to allow EBT participants to shop in nearby non-EBT areas (such as in a city on a State boundary), the rate of conversion could be much higher. (Such a policy could place a substantial burden on local welfare offices, unless it is more automated than in Reading.)

An EBT system needs the capacity to accommodate substantial peaks in demand. Purchase activity in Reading is heaviest on issuance days and the following two to three days. Hourly peaks fall during the heavy shopping period for all customers: 4 to 6 p.m. The daily and monthly patterns combine to produce peaks of up to 1.3 percent of total monthly purchases in a single hour. System functions should be designed to minimize non-purchase activity

[1] Bartlett and Hart, op. cit..

(especially batch processing) during peak purchase periods, unless the functions are processed on different computers (as in the PDPW system).

One reason for the serious slowdowns experienced by the PRC system was design assumptions that underestimated the extent of the purchase peaks by over 40 percent. The PRC designers had assumed a more uniform purchase load than the system actually experienced. This situation was made worse by the overlapping of two major batch functions -- bundle-up and reconciliation -- with the peak purchase period.

The extent of the peak in purchase activity will depend on how regular benefit issuances are distributed over the month. Shifting from a single issuance day to two days a week apart could reduce peak hourly loads 24 percent. A two-week separation of issuances could reduce the hourly peak by an estimated 38 percent.[1] Staggering issuances over several days in the same week is less effective at reducing peak demand, because each issuance boosts purchase activity for several days. A State's ability to reduce peak demand by staggering issuances will depend on whether the benefit issuance mechanism has the necessary flexibility and on how fast recipients use their benefits after issuance.

Once EBT system designers have arrived at their demand assumptions, they must estimate the communications capacity required. Through the use of queuing theory, the number of incoming telephone lines needed can be estimated from the peak demand and the total time a transaction occupies a line (including waiting time and actual processing time). Designers should be conservative in their assumptions about system processing time to avoid underestimating communications line requirements. In the Reading demonstration, PRC had to add a seventh line because it had underestimated processing time as well as peak demand.

The processing throughput of an EBT system should allow substantial excess capacity, even at the monthly peak. Commercial POS system experts suggest that a system should be designed to use 40 to 60 percent of capacity, and that capacity should be expanded when a system reaches 80 percent of

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[1]Estimates based on simulations described in Kirlin and Hamilton, op. cit., Appendix A.

processing capacity. These rules are intended to ensure that a system never exceeds capacity.

The file capacity requirements of an EBT system will depend on the overall level of activity and on the uses of the different files. The recipient and retailer account files should allow substantial excess capacity, even if the system is to be operated on a pilot basis. In Reading, turnover

For an integrated EBT system, the capacity requirements must be considered in the context of overall data processing capacity. Designers should take into account not only the margin of excess capacity required for the EBT system, but also the requirements of other applications sharing the same communications equipment, computers, and storage devices. Possible interactions between EBT activity peaks and the peak periods of other applications should be considered. For example, grocers attempting to sign on to the EBT system could interfere with State workers attempting to sign on their data entry terminals at the same time (and vice versa).

The capacity requirements of an EBT system can be reduced by designing system functions to use capacity as efficiently as possible. Designers should consider how different approaches to a function affect processing time, throughput, and file usage. The design should minimize competition for system resources by shifting non-purchase activity (such as production of management reports) to off-peak periods, or (as in the PDPW system) by processing batch functions on a separate computer.

An EBT system should be designed to permit the monitoring of capacity utilization and its impact on performance. To check the assumptions of the communications capacity estimates, the system should automatically monitor communications line usage including incoming call rates, call duration, and frequency of line tie-ups. System throughput should be measured at regular intervals, especially during peak periods after issuances. Management reports should track file size and warn of files approaching capacity. The monitoring of capacity should be designed to indicate long-term trends and provide necessary data for planning capacity expansion.

An EBT system also should be designed to permit the expansion of capacity. Even the most conservative demand projections may prove too low. Moreover, an EBT system should be capable of expansion to cover a larger geographic area or additional uses, so that economies of scale can be realized. Because it is costly to provide the capacity for large-scale operations, however, the expense could be wasted if the pilot system is not expanded as planned. To avoid this potential extra expense, the system could be modular, so as to permit the addition of telephone lines, upgrading the processor to increase throughput, and use of larger and faster storage devices.

PDPW replaced the PRC software when redesigning the system because the PRC design was highly device-specific, making it too difficult to expand capacity by changing hardware. The use of commercial POS software as the basis for an EBT system may help avoid this problem, because such software is typically designed to run in a variety of environments. Designers should also ensure that the system hardware does not impose requirements on the software that will make the software incompatible with more powerful hardware.

REQUIREMENTS FOR INTEGRATION WITH FOOD STAMP PROGRAM OPERATIONS

An EBT system should be designed to integrate smoothly with ongoing Food Stamp Program operations at the local and State levels. The way in which an EBT system interacts with other FSP operations will affect overall program effectiveness as well as the execution of the issuance and redemption functions. A design for an EBT system should take into consideration the points of interface with existing operations and the requirements for successful integration.

The points of interface between an EBT system and other program operations include:

- certification, which must mesh with EBT account activation and card issuance;
- issuance, which requires communication between the State's eligibility data base and the EBT system;
- reconciliation and participation reporting, which require inputs from the EBT system;
- involvement of local welfare office staff in performing EBT system functions in addition to other Food Stamp Program duties; and
- sharing of State-level staff between new EBT system functions and existing operations.

As part of the general EBT system design process, the design team should review the existing organization of FSP operations and identify the interfaces with the EBT system that will be required. The technical and programmatic requirements of these interfaces should be part of the framework for the detailed system design.

The design team should examine how program functions that will interact with the EBT system are performed. Such a review will be helpful in identifying the options for integrating the EBT system into overall FSP operations. To avoid disruption to program operations, an EBT system should leave as much of the existing procedures in place as possible. Where procedures must be changed to accommodate an EBT system, the requirements should be identified early in the design process.

An important design issue is how the EBT system will fit into the flow of work at the local and State levels of FSP operations. At the local level, EBT card issuance, account initialization, and training will have to be coordinated with the application and certification process. Procedures for handling expedited cases may have to be changed (as when expedited benefits have been issued manually). System designers must consider what other functions will be performed at local welfare offices and how they will be allocated among the different types of staff (caseworkers, clerks, paraprofessionals, and administrative staff). These choices may have repercussions for both the EBT system design and other FSP operations. Similar choices must be made about the roles of central administrative and data processing staff.

EBT system designers should seek to limit the demands placed on the State's service delivery capability, including staffing, scheduling and space. One priority should be to minimize requirements for specialized skills, so that EBT tasks can (if necessary) be performed by as many different staff as possible. System planners should consider the side-effects of EBT functions on other program activity, such as the effort associated with scheduling recipients for training (and rescheduling those who fail to appear).

Along with the functional requirements, an EBT system should be designed for ease of use. Workstation operations should be menu-driven and require as few steps as is consistent with functional and security requirements. To reduce operator effort, routine batch operations should be as automated as possible.

An EBT system design must take into account the technical requirements for interface with the State's other data processing operations. Designers should determine what restrictions and requirements must be met in determining such system features as media for data transfer to and from the

EBT system. Research should be conducted to identify the file format and content required for functions requiring interaction between the EBT system and other data processing, including benefit issuance and acknowledgment, issuance reconciliation, and participation reporting. The design team should also research requirements for communication between the EBT computer and local offices. For example, designers must assess the capabilities of local office data entry terminals and communications lines if they are to be considered for use as EBT workstations.

SYSTEM PERFORMANCE REQUIREMENTS

In formulating the general system design for an EBT system, the design team should establish performance requirements. The general system design should take into account the critical dimensions of system performance, including reliability, processing speed, and ease of use. (Capacity and integration with program operations also are performance issues; these dimensions have been discussed previously.) A State should set clear expectations of how the system must perform to guide the detailed system design, development, and testing. If system development is to be contracted out, performance standards should be part of the requirements for system acceptance.

System Reliability. The reliability of an EBT system is perhaps the most important performance dimension. If an EBT system is not accessible, recipients cannot purchase food and retailers cannot receive credit for sales. System-wide accessibility can be affected by failures of the central processing hardware, communications facilities, or software. Redundancy of key components can help prevent failures from making the system inaccessible. The reliability of other system components, including store terminals and printers, transaction cards, and workstations, is also important to successful performance of issuance and redemption functions. An EBT system must process transactions accurately to protect program participants and FSP integrity.

Processing Speeds. The processing speed of an EBT system is a key factor in the acceptability of the system among program participants. Response times for purchases and other POS transactions affect checkout counter productivity and customer satisfaction in retail food stores. The Food Marketing Institute has stated that the maximum acceptable response time

is 10 seconds.[1] In Reading, where 70 percent of all retailers prefer the PDPW EBT system to the coupon system, the average response time is between 15 and 25 seconds.[2] Recipients should not experience a burdensome increase in the time they must spend to obtain and keep track of their benefits. As noted earlier, the processing speed of EBT workstation functions is an important factor in the system's impact on welfare office productivity. Where an EBT system shares computing resources with other applications, the time required to execute batch functions will affect the ability to meet production schedules for all applications, including the EBT system.

Ease of Use. An EBT system should be designed, wherever possible, for ease of use. The way in which functions are performed affects the acceptability of the system to participant groups, including recipients, retailers, banks, and FSP staff. A variety of design factors affect ease of use, including: the number of needed steps to complete system functions, the amount of training and memorization required to use the system successfully, and the information provided by the system to facilitate use (such as prompts provided by POS terminals and data needed by receiving banks to process deposits). An EBT system's capability to resolve problems encountered by participants is also an important aspect of the ease of system use.

Other Performance Requirements. The EBT system design team should identify the performance requirements of external parties as part of the preparation for designing the system. The most comprehensive of these requirements will be those of FNS. System designers must seek input from retailers on their requirements and expectations, especially with regard to purchase processing speed and ease of use. Advocacy groups or other representatives of food stamp recipients should be consulted on ease-of-use standards. The clearinghouse institution, Federal Reserve branch, and banks receiving deposits should have input on accuracy and ease-of-use standards and on processing schedules.

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[1]Food Marketing Institute, Electronic Benefits Transfer Position Paper, April 1989.

[2]U.S. Department of Agriculture, Food and Nutrition Service, "FMI Position Paper Issue Response," April 1989 (unpublished).

A State may also have internal system performance requirements. The reliability of EBT software is especially important in an integrated setting, where an EBT software failure could interfere with other applications. States may have formal or informal standards for workstation response times. As discussed previously, the ease of system use can have a positive or negative impact on the productivity of FSP staff.

Once the performance standards for an EBT system have been established, the designers should evaluate the potential of the system as designed to attain the standards. At the general design level, this assessment cannot be conclusive, but it may identify critical points for the detailed system design and development. User input may identify desirable features, such as the Reading retailers' requests for a deposit inquiry mechanism. Designers may encounter trade-offs between performance standards and other design requirements. For example, PDPW chose to give up the higher transaction processing speed offered by one software vendor in exchange for higher reliability and ease of maintenance.

An EBT system must be designed to provide necessary performance information. Data on reliability and processing speed should be collected automatically, to facilitate management and reporting to FNS. In designing the PDPW EBT system, project staff were able to draw on existing utility software to record system uptime and capacity utilization, although they later found that some adaptation of the reports was required to meet FNS and evaluation data requirements.

SPECIFYING THE SYSTEM CONFIGURATION

Once the functional, performance, and user requirements for an EBT system have been determined, the system configuration must be specified. While the selection of specific equipment may be part of the detailed design process, the general system design should identify the basic requirements for system hardware, telecommunications, and software.

In specifying the hardware configuration for an integrated EBT system, a State should begin by assessing the capabilities of its existing data processing system to meet EBT requirements. This appraisal should consider whether the State will need to enhance, upgrade or add to its array of central processors, storage devices, terminals, and other input/output

devices (such as audio response units to support telephone inquiries). The capacity and reliability of the existing hardware are particularly important considerations. Another important consideration is the degree of compatibility with available off-the-shelf POS software packages.

PDPW was able to implement its EBT system without investing in new central processing hardware because of relatively recent investment in advanced, powerful computers. Other States may find that an EBT system will require faster processors or more storage capability than they currently possess, especially if operations are to be expanded to a large scale.

A key hardware configuration issue is whether processing will occur on a single computer or a combination of computers. The single processor approach (as used in the PRC system) simplifies development and operations and holds down costs, but it requires compromises in design that may limit performance or expandability. PDPW chose to divide processing between on-line functions, performed on Tandem minicomputers designed for on-line processing, and batch functions, performed on Unisys mainframes. This design approach is the norm in commercial POS systems. Some States may lack the kind of specialized on-line processing hardware required for two-part processing, forcing a harder look at the costs and benefits of investing in this hardware.

An EBT system requires specialized equipment for functions performed at the point of sale and at local welfare offices. The general design for an EBT system should identify design requirements for the POS terminals, printers and balance inquiry terminals (if included in the functional specifications); key features of this hardware include communications protocols, memory capacity, programmability, and built-in functions. Depending on existing ID requirements, an EBT system may require the State to specify requirements for new card production equipment or verify the compatibility of existing equipment with EBT system requirements.

The design team should determine whether the workstations in place at local welfare offices will support EBT functions, such as card encoding and printing account histories. PDPW found that the Tandem terminal (planned for use as the EBT workstation) could not drive a card encoder, so a more sophisticated off-line encoder was needed. A specially designed workstation (such as the IBM personal computer used in the PRC system) may fit the functional requirements of an EBT system more easily than a generic workstation.

However, system designers should consider whether the long-run benefits of using a single, standard workstation for all FSP functions justify the extra effort to design the EBT system around terminals already in use. PDPW project staff have found that because their EBT software is designed to use the Tandem terminal, it will be difficult to shift workstation functions to the Unisys terminals used for other local office operations.

In considering the telecommunications configuration for an EBT system, the design team should weigh a number of factors. Some approaches may be simple and inexpensive to implement for a pilot project, while others are faster, more reliable, less expensive to operate, and easier to expand. The PRC approach was geared to a short-term demonstration: regular measured-service lines were installed for the store terminals, and the EBT Center was located in Reading, avoiding the need for long-distance links. PDPW wanted to avoid reprogramming the store terminals, so it installed off-premise extensions to link the computers in Harrisburg with the Reading stores. PDPW reduced long-run store line costs by investing in the one-time cost of converting the lines to Centrex service; a WATS line is used for the dial-up workstation at BCAO. Project staff have indicated that for a system built from scratch, a packet-switching network might offer lower cost and greater reliability.

The general design for an EBT system must specify the programming language to be used. A language already in use in State data processing may be preferable because existing staff will be capable of maintaining and enhancing the software without extensive training. On the other hand, a language that is specifically intended for on-line processing (such as EDL) may offer greater speed, reducing demands on hardware. If a State chooses to use an off-the-shelf software package, it should make sure that the package uses a language supported by the State's computing environment. PDPW restricted its search to packages written in COBOL, the language it uses for other data processing applications. System designers should also consider whether the introduction of a new language will require special approval from Federal or State authorities (as PRC found when it chose PL1 as the language for its system).

3.5 PREPARING AND REVIEWING THE DETAILED SYSTEM DESIGN

To ensure successful implementation of an EBT system, a State needs a detailed system design. The general system design, including functional requirements, performance standards, and requirements for interfaces with program operations and outside institutions, has to be translated into detailed specifications. The detailed system design should include: step-by-step process flows for all functions; formats for system files, transaction messages, and benefit card data; specific equipment to be used; telecommunications line requirements; and requirements for the EBT system hardware environment (such as back-up power for computers). The process of preparing the detailed design provides a basis for additional input from future EBT system users and other affected parties to guide system development toward an acceptable, workable system.

A State planning to implement an EBT system must address several questions during the detailed design stage:

- What role will the State play in preparing the detailed system design?
- How much will the detailed design rely on existing software?
- What documentation of the detailed design will be produced?
- How will the design be reviewed, and by whom?

This section discusses the significance of these questions and the requirements for producing and reviewing the detailed design for an integrated EBT system.

THE STATE'S ROLE IN PREPARING THE DETAILED SYSTEM DESIGN

A State may assume any of a range of roles in preparing the detailed design for an EBT system. At one extreme, State staff could perform all detailed design work; this approach would be most appropriate if the State plans to develop the EBT system in-house. The opposite approach would be the turn-key model, in which a contractor takes general design specifications and produces a detailed design for approval by the State. Between the extremes of in-house and turn-key design is the joint approach, in which contractor and State staff collaborate on the detailed design.

Involvement of State staff in preparing the detailed design has a number of advantages. If the staff who have prepared the general design participate in fleshing out that design, they can help to clarify the design requirements as questions arise, instead of at a design review stage. State staff are more familiar with the program environment than contractor personnel, whose most relevant experience is likely to be with commercial POS systems. If State staff have participated in the preparation of the detailed system design, they will acquire a deeper understanding of how the system operates, which will facilitate their involvement in the later stages of development, testing, and implementation.

Wherever possible, the preparation of the detailed design for an EBT system should involve program staff as well as system analysts and other data processing personnel. Interaction between program staff and systems staff can help bring out and resolve trade-offs between program requirements and technical constraints. Program staff can provide particularly useful input on the design of functions that affect recipients and local welfare office staff. State participation is particularly important in designing the interfaces between the FSP data base and the EBT system, given the complexity and importance of this part of the system. The involvement of program staff in system design also makes them more informed about the technical side of the system. In addition, helpful channels of communication between program and systems staff can be established.

Extensive State involvement in the detailed design process requires a substantial commitment of resources. The creation of a detailed design for an integrated EBT system requires in-depth involvement by experts in the specialized field of POS and EFT technologies, as well as input from staff familiar with the State's data processing environment and FSP operations. In deciding its role in the detailed design process, therefore, a State should consider the expertise of its staff, their other time commitments, and the time and funds available to add in-house expertise. PDPW made substantial use of vendor personnel in preparing the design documents to compensate for the conflicting demands on the State's technical staff.

A State might choose the turn-key design approach to minimize the burden placed on its staff. The approach shifts the focus of the State's effort to setting design criteria and evaluating contractor proposals, as FNS

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Adapting an off-the-shelf design to an EBT system, however, may pose its own problems. The design may make it difficult to add special EBT functions, such as manual debits and benefit conversion, requiring compromises that reduce ease of use or other desired characteristics. The State's computer environment may not be fully compatible with commercial packages designed for state-of-the-art processing centers, requiring substantial effort to adapt the design. Interfaces with other applications, such as eligibility determination and issuance, may pose greater problems, especially if a high degree of interaction is desired.

Commercial software developers' desire to protect their products may pose hurdles for EBT system design. Restrictions may be imposed on the use of the software (e.g., to avoid competition with commercial POS systems) or on modifications that may be desirable for an EBT system. The State may be provided with less complete documentation of the system design than if the system were custom-designed. PDPW encountered delays in receiving documentation of its on-line processing software, and the final documentation was quite general in its discussion of transaction processing.

The State's design team should carefully weigh the advantages and disadvantages of using off-the-shelf software before making their choice. The availability of in-house expertise and the cost of outside sources to produce custom software will be important factors. The likelihood of future integration between the EBT system and commercial POS networks should be considered. Finally, the extent of the State's interest in related applications, such as a multi-program system or other electronic-funds-transfer uses, may affect the choice between off-the-shelf and custom software.

DOCUMENTATION OF THE DETAILED SYSTEM DESIGN

Whatever design approach is taken, it should produce a detailed, comprehensive design document. This document should specify how the EBT system will meet the functional requirements and user needs (including performance standards, security requirements, and system integration issues) set out by FNS and the State. It should identify the responsibilities of participating groups, including system operations staff, State program workers, USDA, retailers, recipients, and financial institutions. Performance specifications and the underlying assumptions should be presented. The system

configuration should be described. All interfaces with existing State operations and outside institutions should be identified, and the procedures for interaction should be stated in detail. Drafts of user manuals and other documents may be included, as they were in the package submitted to FNS by PRC. Finally, the design document should include a revised schedule for development, testing, and implementation.

The detailed system design document serves as the basis for the design review and for system development. If design and development are contracted out, the design document will establish contractual responsibilities for the developer. The design document will also be needed for approval by USDA and possibly by State authorities outside the Food Stamp Agency (such as the State Attorney General).

REVIEW OF THE DETAILED SYSTEM DESIGN

All affected parties should have the opportunity to review the detailed design for an EBT system. The primary reviewers should be the members of the design team, but the process should also include supervisors from the computer operations unit and local welfare offices. In addition, all participants outside the State should be represented, including retailers, recipients, the clearinghouse bank, other financial institutions, and USDA. The secondary reviewers may need to review only select sections of the design; a useful alternative is to prepare a separate, non-technical summary of design features that are important to certain groups, such as retailers. The State may also wish to obtain a critique of the design from an independent consultant with expertise in direct-debit systems using comparable hardware.

The design review should be a comprehensive assessment of the strengths and weaknesses of the system design. Reviewers should confirm that the system will meet functional and program requirements. If any regulatory changes or waivers will be required, they should be pointed out. The review should assess whether the system as designed is likely to meet the applicable performance standards, both in the pilot stage and in large-scale operations. Assumptions that are critical to meeting performance standards should be identified and targeted for testing during development. Provisions for integration with existing program operations should be examined, with input from managers of local welfare offices and data processing operations.

Representatives of grocers, financial institutions, and USDA should scrutinize and comment on the procedures for interface with their institutions and on the requirements that the EBT system will impose on them. State data processing policy may require a quality assurance review by a special unit to determine if the design meets the State's standards of efficiency, quality control an documentation. Finally, project staff and top managers should verify that the plans for development, testing, and implementation are realistic. Critical points in later project stages should be identified to focus oversight.

The design review can occur throughout the preparation of the detailed design or when the detailed design is complete. Ongoing design reviews are a natural extension of the joint design approach followed by PDPW: as major portions of the design are completed, they are submitted to interested parties for comment. In a turn-key project, it may be more appropriate to make the design review a formal milestone to occur once the complete design has been delivered. Such a review might consist of a series of sessions to accommodate the different participant groups.

- Each of these approaches to design review has its own strengths and weaknesses. A series of ongoing reviews, such as those conducted by PDPW, enables participants to focus on relatively narrow topics and avoids overwhelming them with the entire (usually voluminous) system design at once. Ongoing reviews provide quick feedback, enabling the project to stay on schedule. A final review of the completed system design, however, may be more comprehensive, and it may make it easier for participants to make connections between different topics. In a turn-key setting, the design review will presumably serve as the basis for acceptance of the system design, so thoroughness is especially important. Whichever approach is taken will require a substantial commitment of time, given the complexity of EBT systems and the variety of requirements they must meet.

The design review will, inevitably, identify oversights and problems in the design. Depending on the nature of the changes required, they may require extension of the design period, or they may be included in the tasks to be accomplished during development. Reviewers must recognize that no system design plan is final; design changes will be made during development as unforeseen issues and problems arise. The State should ensure that participants in the design review are informed of subsequent changes that may affect

their institutions. In addition, the detailed design document should be updated as design changes are made. Lack of updated design documentation was an important obstacle during the early months of PDPW's operation of the PRC system.

Chapter Four

DEVELOPING AN INTEGRATED EBT SYSTEM

In developing an integrated EBT system, the primary tasks are writing (or adapting) system software and testing whether it meets design requirements. Software development and testing require a number of subsidiary tasks, such as acquiring POS terminals, modifying or replacing hardware, and setting up telecommunications facilities. System developers also need to document how the system operates in technical and functional terms.

System development is considered a separate stage from EBT system design, but the two activities may overlap. The developer may begin development while detailed design issues are still under discussion if formal approval of the detailed design is not required. Even if formal approval of the design is still pending, the State may permit activities that take place early in development, such as ordering equipment with long lead times. In addition, the EBT system design may be revised during development as unanticipated problems or issues arise.

Preparation for the implementation of an EBT system should begin during the development phase, so that implementation can begin as soon as the system is approved for operation. The necessary preparations for implementation include: assignment of responsibilities, scheduling, contingency planning, preparing training materials, recruiting retailers, and establishing agreements. The development of an EBT system concludes with a successful acceptance test. Thus, development may continue after the initial acceptance test if problems remain.

After discussing several different approaches a State may follow in developing an EBT system, this chapter describes what needs to be accomplished for each of the development tasks mentioned above. In the area of software development, the programming requirements discussed include: interfaces between FSP files and the EBT system, transaction processing, settlement, reconciliation, and management information.

Unlike the design activities discussed in Chapter 3, many development activities can proceed concurrently. The conceptual timeline in Appendix A shows how development activities fit into the overall process of establishing an EBT system.

4.1 APPROACHES TO DEVELOPING AN INTEGRATED EBT SYSTEM

The range of possible approaches to developing an integrated EBT system revolves around two basic questions. First, how much of the system is custom-developed, and how much consists of off-the-shelf products? Second, what role will the State play, and what roles will contractors play?

Developing a complex product such as an EBT system from scratch is costly and time-consuming. PRC spent $1 million during the development phase of the original Reading EBT demonstration, which lasted nine months. The growth of the commercial POS software industry in recent years has made total custom development of an EBT system unnecessary. If a State procures EBT system development on a competitive basis, the lowest qualified bids will almost certainly be adaptations of commercial packages. These packages will probably offer more features for the money, and they will have, in most cases, the valuable advantage of extensive field testing in operational debit card systems.

Custom development of an EBT system by State staff would be a practical option only if no qualified vendor were available. Such a project would require substantial investment in expertise for most States, because the on-line processing demands and commercial environment of an EBT system differ substantially from other State data processing functions. The difficulty in assembling the necessary personnel in the environment of a State Agency could mean a longer time frame for custom development than in a private contractor setting.

For these reasons, the most practical scenarios for future EBT system development center on the adaptation of a commercial POS software package. In this context, a State could take either of two basic approaches. First, it could contract with a POS system vendor on a turn-key basis, requiring little or no direct involvement of State staff in development. Second, the State could be a developer or a co-developer, either by contracting with a vendor to provide a base package and support for in-house development, or by purchasing POS software and adapting it without outside help.

THE TURN-KEY APPROACH TO EBT SYSTEM DEVELOPMENT

In the turn-key approach to EBT system development, the contractor is responsible for translating the State's design requirements into an operational system. The contractor adapts the software; procures or arranges for the hardware and communications setup needed for testing; and produces manuals, training materials, and other documentation.

The contractor for a turn-key EBT system could be the creator of the software package used or another firm. Indeed, more than one firm could be involved. The State would want to designate a prime contractor for system development, however, to avoid having to coordinate the activities of multiple vendors. The State also needs to recognize that if the vendor of the POS software being used is not part of the development team, that vendor may not support the use of its software in an EBT environment. That is, after the software has been modified for EBT application, the software vendor may not be willing to provide assistance if software problems develop. In this situation, the State should make sure that adequate follow-up assistance is available to maintain the software after start-up.

Even in a turn-key project, the contractor will need considerable assistance from State technical and program staff. In developing interfaces with benefit issuance and other program functions, the contractor will need technical information from the analysts responsible for those applications. Those analysts may be required to produce additional software to accommodate the EBT system, as PDPW staff did for the PRC system. Program staff will need to provide information on program requirements and local office operations. Cooperation of systems staff will be needed to arrange for the developer to have access to the State computer facility and staff for hardware modifications and testing. The contractor will also have to communicate with operations managers to develop system operating procedures that will mesh with the State's production environment.

The turn-key approach has a number of advantages. It places the least requirements on State staff, who may lack the time or expertise to contribute directly to the development effort. A turn-key system that is closely based on the vendor's existing software is likely to have the lowest up-front cost of any development approach, because of the minimal requirements for consultation and changes during development. For the same reason, turn-

key development is likely to be the fastest approach. In addition, the State can exercise additional control over costs and quality by awarding a performance-based or fixed-price contract. The contractor could even assume responsibility for implementation and operation of the EBT system during a pilot period. In this "full turn-key" approach, State staff would be trained on the job during pilot operations, assuming full operating responsibility once the system reached a steady state.

A turn-key approach will tend to produce an EBT system with fewer custom features than would be provided if the State were more directly involved in development. Turn-key development limits the State's input to the interpretation of design requirements and the integration of the EBT system into the State's operating environment. Also, the State will not develop the level of expertise and familiarity with the system that comes with more direct involvement, so staff will need more training before they can assume operating responsibility. Finally, turn-key development may expose the project to a greater risk of delay or abandonment than in-house development if the vendor is not capable of completing the system on time (e.g., because of lack of experience or capital). Thus, potential vendors' past records and financial status should be scrutinized carefully before the vendor is selected.

A State will need to take a number of steps to successfully manage turn-key development of an integrated EBT system. The State must establish a mechanism for monitoring how the design requirements are being met, identify gaps in the design, and resolve problems before they cause time-consuming and costly revisions. Periodic progress reports and meetings are useful in this regard. The State should establish clear lines of responsibility for monitoring the developer, and those responsible must be empowered to exercise their responsibilities effectively. Program staff as well as technical personnel should participate in the monitoring group.

As described in Chapter 5, a complete acceptance test is the main means of assessing the functionality of an EBT system. Because State involvement in development activities is limited in a turnkey approach, however, the State should also specify several interim milestones in the development process and evaluate the contractor's progress at these points of development. In this way the State can exercise greater control over both schedule and the quality of the final product. In addition, the release of contract funds can be tied to successful completion of these milestones.

One interim milestone is the completion of all software development (or major sections of the software). The State's system analysts (and possibly an expert consultant) could examine software logic and the results of software testing.

A functional demonstration of the system, such as the one conducted by PRC for FNS, is another means for State program and technical staff to evaluate system development before the formal acceptance test. The contractor could be required to demonstrate parts of the system as they are developed, such as data screens, transaction processing, and reports. Alternatively, a single date could be set for demonstrating all major system functions. The functional demonstration differs from an acceptance test because production hardware is not necessarily used (the developer's own hardware might be used instead) and some functions that require cooperation by outside actors may be simulated. A functional demonstration can be a useful training device for the staff who will eventually have responsibility for the system.

The role of FNS during the development of the PRC system resembled a State's role in the turn-key approach. FNS established the functional requirements for the system, selected PRC, and conducted a critical review of the PRC design. Once FNS approved development, it held biweekly meetings with PRC to track PRC's progress and to resolve numerous detailed issues of system design and operations. The primary means by which FNS ensured that the system was properly developed were a functional demonstration and the system acceptance test. The functional demonstration was an important milestone that tested the major software components of the system. It differed from a full acceptance test in that the system's computers were not located in the final operations center and all elements of the system's telecommunications network could not be tested.

EBT SYSTEM DEVELOPMENT WITH THE STATE AS CO-DEVELOPER OR DEVELOPER

Active State participation as a co-developer or developer of an EBT system could take any of a variety of forms. The State could purchase a software package and perform all of the customizing in-house, using permanent staff, consultants, or a combination of the two. The State could contract with a vendor of off-the-shelf POS software or a third-party firm for part of the adaptation and do the rest itself. One or more contractors could write

and unit-test the software, while the State assumed primary responsibility for hardware and communications preparation and for system testing.

A State that chooses to customize a POS software package without the aid of a contractor will have more control over the final product and the cost of development, but it will face a number of challenges. Some vendors may be reluctant to permit substantial modifications to their software or to provide adequate documentation for customizing by the buyer. The State might not possess or wish to invest in the level of expertise required to adapt POS software, especially in the areas of banking and food retailing. In addition, State staff will probably need more time to adapt an unfamiliar POS software package than contractor staff who have installed the same package in other environments.

For these reasons, a State that wishes to participate in the adaptation of software for an EBT system may find a joint effort with a contractor to be the most viable alternative. This co-development approach provides the State with the opportunity for closer and more effective oversight of development and more input on the realization of the system design. State participation is particularly important if the system is to include major features that have not been implemented previously, such as a multi-program EBT system. If the development team includes as an integral part the State staff who are familiar with the operating environment into which the EBT system must fit, the contractor may be able to identify and solve interface problems sooner, before they become obstacles.

At the same time, State staff can develop in-depth understanding of the EBT system by participating in development decision-making and testing. Finally, co-development will facilitate coordination between the contractor and State staff responsible for setting up the hardware and other resources for testing and installation of the software.

State participation as a co-developer in the adaptation of a POS package for an EBT system imposes some burdens, however. There must be qualified staff who have sufficient time to master the details of the EBT system and experience in managing development by a contractor. These staff must also have enough authority within the State organization to coordinate the necessary resources, including hardware, communications and personnel, each of which may be under the control of a different unit. If the

contracting involves more than one vendor, the State staff must ensure coordination among the parties and resolve disputes if they arise. Responsibilities should be clearly delineated among State development staff and vendor personnel.

PDPW's approach was a variant of the model of the State as co-developer. The State's primary data processing vendor (Unisys) supplied the software through a combination of in-house development and a subcontract with a software vendor (MTech). MTech provided the base POS package and adapted it to perform the front-end functions, while Unisys created the software to perform the back-end functions (reconciliation, ACH tape production and reporting) on the State's Unisys mainframe. State staff oversaw software development, prepared the hardware and communications configuration needed for testing, and participated in installation and testing of the software. PDPW did not have to acquire POS terminals for testing or modify benefit issuance and reconciliation software, because these resources were already available from the existing EBT system.

- PDPW's arrangement for developing its EBT system had several advantages. By using its established relationship with Unisys, PDPW minimized the time and effort required to set up the development team. Unisys was also willing to provide the software at no direct charge to the State, because of its existing contract relationship with the State. (Other States may be able to persuade their hardware vendors to share EBT system development costs under a similar arrangement.) Unisys was the expert on the back-end hardware, which was a new environment for the MTech software.

However, PDPW's development approach did complicate the process. One disadvantage was that the Unisys personnel were learning about debit-card systems through their involvement in the project, a situation which contributed to delays in system development. The geographic distance between Unisys and MTech and the vagueness of the design on some points made coordination difficult. This situation contributed to problems in the interface between the front-end and back-end software that was required to perform the bundle-up and reconciliation functions.

In a setting with multiple vendors, therefore, State staff will have to monitor development closely. While they will have to work through the prime contractor, they must promote coordination between the vendors so that

design issues that cut across the vendors' areas of responsibility are handled consistently (e.g., making sure that when data are passed between computers, the sending computer's output format can be processed by the receiving computer). The State will have less leverage if development costs are largely or totally borne by the prime contractor. To effectively oversee development, the State technical staff need a firm and detailed grasp of the design, so that they can answer questions and probe the developers' understanding. PDPW staff assisted the development contractors by showing them how special EBT functions were performed in the PRC system.

State staff need to make sure that the vendors stay on schedule so that problems encountered by one do not put a halt to development by the other. If possible, key staff of all parties should hold regular, face-to-face meetings. State staff should anticipate the kinds of questions that vendors should be asking at each stage. In this way, the questions that arise can serve as indicators of the real status of development, as a check on formal progress reports given by the vendors.

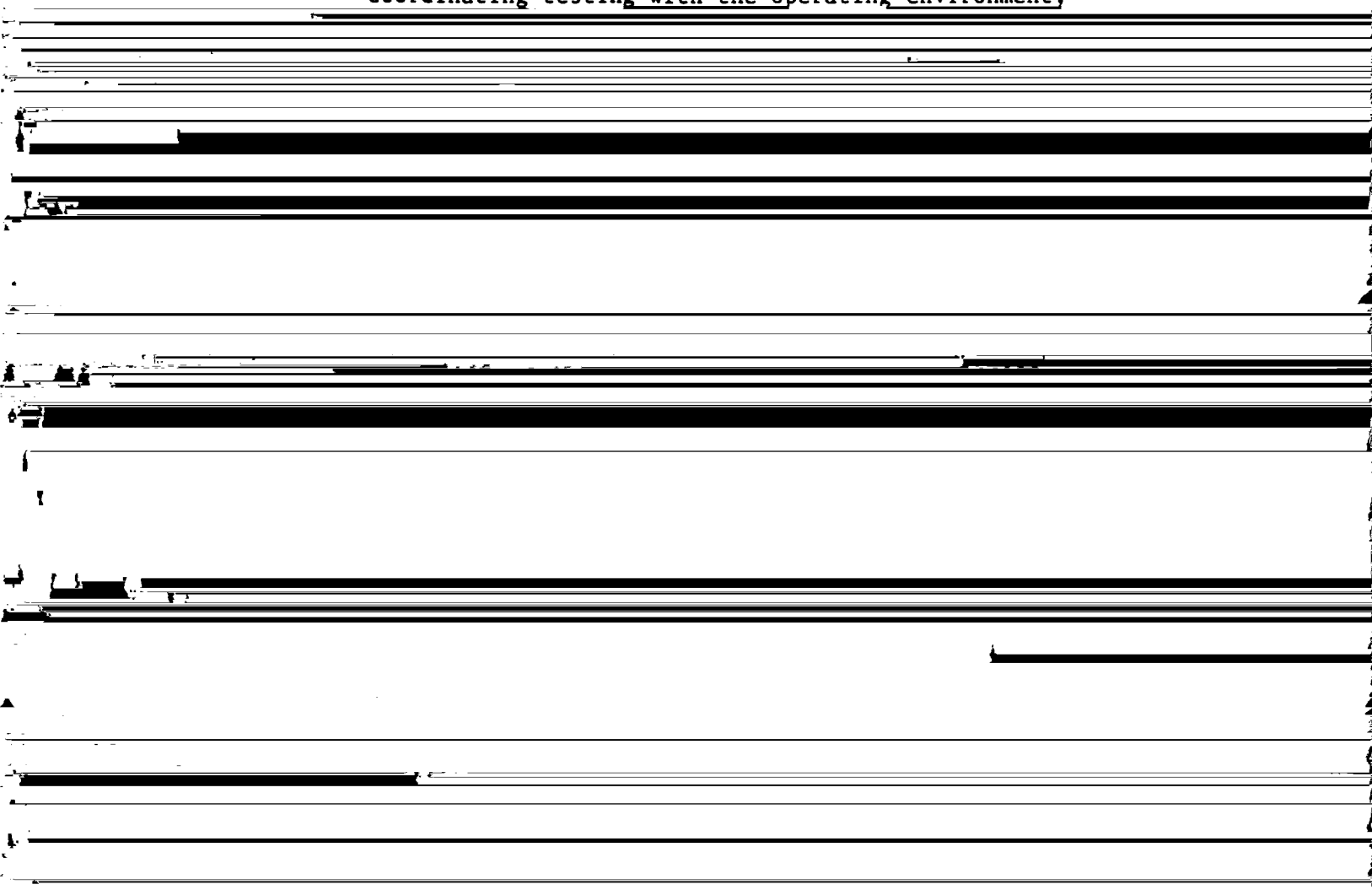
- PDPW technical staff used several management tools during EBT system development. They reviewed report designs, other interim products, and a sample version of the base MTech software. They held weekly progress meetings with the primary contractor at which they tracked task completion and discussed issues that had arisen. To secure information needed by the vendors, PDPW technical staff served as liaison to PRC, the clearinghouse bank, and State program staff. State program staff followed development progress and contributed to discussion of some issues (such as card encoding procedures) through weekly project staff meetings. Program staff also received occasional demonstrations of data screens and other functions.

While the participation of State staff as co-developers provides an important means of control, a State may still wish to establish formal milestones to check on the progress toward development. As discussed earlier, the main options are reviewing software logic and functional demonstrations. These options will add to development costs (if they are being charged to the State) and extend the development period, but they may detect problems before they cause major delays or cost overruns.

4.2 REQUIREMENTS FOR EBT SYSTEM DEVELOPMENT

The requirements for developing an integrated EBT system include the following:

- writing and debugging system software,
- preparing equipment needed for development and testing, including new equipment acquisition and modification of new or existing equipment,
- preparing communications facilities required for development and testing,
- installing EBT software on the existing hardware and coordinating testing with the operating environment,



This section discusses the nature of these requirements and concerns that developers should bear in mind.

WRITING AND DEBUGGING SYSTEM SOFTWARE

The developer of an EBT system must produce the necessary software by adapting existing software or, where necessary, by writing custom soft-

- internal processing, including file creation and updating, transaction processing, and communication between computers;
- interfaces with external devices (transaction terminals, workstations, audio response unit, coupon dispensers, etc.);
- interfaces with other computer systems (Household Master File, Issuance Authorization File, clearinghouse institution, FNS redemption data base, etc.);
- reporting functions, including reconciliation, performance monitoring, and management information; and
- file maintenance, including creation of files, archiving and purging.

Depending on the system design, the developer also may need to create software for peripheral devices, such as workstations, transaction terminals, and audio response units. Some of these devices may require specialized programming by the manufacturer or other experts. For example, a specialist was needed to program the audio response unit for the PDPW system.

The software development activity for the PDPW EBT system focused on two areas: the workstation functions and the batch operations. Many of the EBT workstation functions (such as zeroing out a client balance and entering manual debits) did not exist in the base software. Other EBT workstation functions required modifications to existing procedures. Development of the batch processing software (including bundle-up, reconciliation, and reporting) was the most difficult part of the effort because of the need to synchronize the data on two different computers, and because the Unisys programmers had to produce custom code.

If the EBT system is to be based on existing POS software, the developers should carefully examine and evaluate the features available in the base software before attempting to create entirely new software. This approach will reduce the cost and time required to develop the EBT system. Software for system reconciliation and management reports, for instance, should be reviewed to see if it meets program requirements. It will be much simpler to use or modify such software than to develop it from scratch.

The software development requirements for an EBT system may include modifications to other systems with which the EBT system interacts. The State personnel responsible for the existing benefit issuance, reconciliation, and reporting software will have to create additional programs to accommodate the EBT system, as PDPW did for the PRC system. The clearinghouse institution may have to alter its ACH processing software. Minor software modifications at the FNS Minneapolis Computer Support Center may be necessary to read the redemption data files generated by the EBT system and reconcile them with draw-downs against FNS funds.

Once the developers have identified all of the software components needed for the EBT system, they are ready to begin the production of the software. The major steps in this process are: preparation of program specifications, writing program code, testing and debugging each module, and integrated testing of software modules. For those modules which exist in the base software, developers must review the program specifications and logic, determine any necessary modifications, and implement and test those modifications.

EBT system developers will need access to the systems analysts responsible for the overall operation of the State data center for several reasons. The developers should already know the basic capabilities of the hardware, but they need to know the specifics of the installation, such as the version of the programming language used and any special features of the particular hardware in place. They may also need details on the applications with which interfaces are necessary, such as the Household Master File, Issuance Authorization File, benefit issuance, and issuance reconciliation.

At the same time, the analysts responsible for State data center operations will need information from the EBT software developers. The State's system experts will need to understand how the software will use system resources, so that they can anticipate conflicts with other applications and begin planning for implementation. This analysis and the coordination of interfaces for benefit issuance and reconciliation will be easier if lines of communication have been established during the preparation of the detailed system design.

PREPARING EQUIPMENT FOR DEVELOPMENT AND TESTING

Much of the equipment required for EBT system operation must be in place prior to acceptance testing. Developers must have access to the type of equipment that will be used, so that they can test software modules as they are developed.

The exact equipment requirements for an EBT system will depend on the design. The basic hardware requirements for any EBT system are:

- front-end processors (primary and back-up computers for on-line processing) and associated peripherals (disk drives, tape drives, printers, and a control terminal);
- back-end processors, if separate, including primary and back-up computers and associated peripherals;
- modems and other telecommunications equipment for communicating with terminals and other sources;
- workstations (including terminals or microcomputers, printers and, if a dial-up link is used, modems);
- card production equipment, including devices to imprint identifying information, encoding hardware, and testing equipment;
- terminals and printers; and
- balance inquiry hardware, such as balance-only terminals and audio response units.

The equipment requirements for development include most, but not all, of the equipment needed for the production system. All of the central components will be needed for system testing, if not before. However, only one workstation, one set of card encoding equipment, and a small number of terminals and printers are needed at the development stage.

What hardware must be procured will depend on what the State already possesses. Any State planning to implement an integrated EBT system will already have the back-end processors, although some upgrading (faster processors, bigger disks, etc.) may be required by the design. Many States will also have the front-end processors and telecommunications hardware to support interactions between local welfare offices and the data center; these, too, may require upgrading. Depending on the system design, existing local office data entry terminals may serve as workstations.

If new equipment must be procured, this activity should start as soon as the detailed design is approved. Limited supply or high demand may mean a substantial wait before manufacturers can fill hardware orders. PRC experienced lead times of 60 days for computers and 90 to 120 days for terminals. If hardware is not ordered in time, the developer could be forced to delay programming activity. It may be necessary to authorize hardware procurement before the detailed design is fully approved, as FNS did to speed up development of the PRC system.

The EBT system design may require the modification of existing equipment, such as the addition of ports for new peripherals. New equipment also may require adaptation if it does not fit the specific requirements of the design in its off-the-shelf form. For example, the POS terminals may need special programming. Some modifications may be done by the developer or by State systems engineers. However, modification and installation of major components is likely to require assistance from the equipment manufacturer or other outside parties. In some cases, modifications to new equipment may be done before the equipment is shipped (as when terminal manufacturers program their hardware to the customer's specifications). Any modifications that will be required to support development and testing should be identified and scheduled as early as possible, to avoid bottlenecks.

Once the necessary equipment has been obtained and adapted as needed, it must be tested. Individual components can be tested as they are ready, but they should be assembled as soon as possible into a prototype of the system. Testing the components together will help make sure they are compatible, and will provide a more thorough test of the individual components.

While testing equipment for the PDPW system, State staff discovered that the encoder they had planned to use did not reliably encode the special benefit cards that were already in use in the PRC system. After consulting with the encoder manufacturer, the State replaced this model with an older version that did not compute the PIN offset. As a result, an additional software module had to be created so that the Tandem minicomputer would perform this computation.

Some pieces of equipment may appear minor from a technical perspective but play a critical role in program operations. For example, PRC did not

initially include a printer with the workstation it installed at the local welfare office. The lack of a printer forced welfare office staff to copy data by hand when they made queries to the EBT system. This same device became a sticking point in the development of the PDPW system for a different reason: attaching the printer to the Tandem terminal required purchasing an adapter. State policy prohibited installing purchased equipment in a leased item, such as the Tandem terminal. This problem was set aside at the time it was discovered and only resolved much later when the hardware vendor loaned an adapter to the State. While this appears to be a special situation, other States may have similar restrictions on the changes that can be made to leased equipment.

While the full complement of POS terminals is not needed during development, it may be financially advantageous to order them in bulk at this time. This approach may reduce the unit cost of the terminals, especially if they must be programmed by the manufacturer. Another approach to reducing terminal cost is to minimize the programming requirements for the terminals. This approach will also help to ensure that the system is not dependent on a particular type of terminal, as was the PRC system.

Selection of the terminals should take into account not only the immediate needs for pilot operations but also the long-run plans for the system. Once terminals are in place, it is costly (and inconvenient to the retailers) to replace them. PDPW staff would have preferred to replace the specially programmed OMRON terminals installed by PRC with more standard units, but the cost and implementation problems were too much of an obstacle. Issues that should be considered in selecting terminals include: compatibility with the software and communications configuration that will be used, durability, ease of maintenance or replacement, and potential for use in commercial POS applications (even if the system is not designed as an integrated EBT/POS system).

PREPARING COMMUNICATIONS FACILITIES

An EBT system must have sufficient telephone lines to support communication with POS terminals, balance inquiry terminals, and remote workstations. Depending on the system design, lines to support telephone balance inquiries also may be required. External communications lines are not

required for development, but trunklines and at least some retailer lines must be installed in time for acceptance testing (and possibly the functional demonstration, if planned).

The development team should review the line requirements identified in the design stage, determine the availability of existing lines to meet these requirements, and arrange for the installation of additional lines to complete the desired configuration. To perform these tasks, the development team will need the cooperation of managers responsible for telecommunications at the State data center and one or more telephone companies. Special requirements, such as dedicated lines for workstations or off-premise extensions, may require more lead time than routine installations. If a packet-switching network is to be used, the development team must make arrangements for tying into the network and installation of necessary equipment in time for acceptance testing.

PREPARING FOR SYSTEM TESTING

To complete the debugging of the EBT software and make sure the hardware functions properly, the development team must test the system as a whole. Unlike the acceptance test, system testing in the development phase is expected to identify "bugs" in the software that only become apparent when the hardware and software components interact. Thus, the version of the software used in acceptance testing can be prepared only after the earlier phase of system testing, which is discussed below, is completed. Chapter Five of this report presents the requirements and choices for the system acceptance test process.

To prepare an integrated EBT system for overall testing, the development team must install the software on the State's (or the vendor's) computer system. In addition, the developers must coordinate testing requirements with the established production environment. Software installation and system testing may require the cooperation of numerous data center personnel, including systems engineers, computer supervisors and operators, telecommunications specialists, and production control staff. Moreover, the installation and testing must be kept separate from production operations so that neither activity interferes with the other.

If possible, the development team should have direct access to the computers on which the software is to be installed and tested. If security considerations preclude such access, a senior staff person who does have access should be assigned to function as liaison between developers and those inside the secure area.

SYSTEM TESTING

EBT system testing during the development stage can take a variety of forms. If system software is developed by an off-site contractor, it may be installed and tested as a system on the contractor's computers before the test copy is delivered to the State. While such testing will identify some problems with the interactions between modules, the software should be installed and tested on the State's computers as well. Once the development team is satisfied that the EBT software functions properly, they may conduct one or more functional demonstrations for the benefit of State management and other interested parties.

- System testing should be as thorough and realistic as is practical. The tests should address not only the functional specifications, but also the requirements for system capacity and performance standards. The development team should identify critical design assumptions (such as transaction processing speed) and target them for early testing, so that time-consuming changes (such as addition of telephone lines) can be made in time for the scheduled acceptance test.

PDPW had a unique advantage in conducting system tests: the presence of the PRC system provided live transaction data identical to what the PDPW system would face. In one sense, these data provided a more powerful test than simulated data created by developers. For instance, some important issues were identified through the testing with live data, such as the inability of the software to accept balance inquiries from the existing balance-inquiry terminals. (The State replaced these terminals with units programmed to be compatible with the new software.) However, live transaction data may not replicate all possible processing situations, so they must be supplemented with simulated test data.

Other States will have to simulate system files and transaction loads for system testing. Such simulation should be based on patterns in

other systems, such as the PDPW system or commercial POS systems with which the developers are familiar. Special equipment may be needed for this simulation or to perform system diagnostics, although some computer systems have such capabilities built in. Software packages for simulating EBT transactions and monitoring system processing may be available through the development contractor (if one is used) or a firm specializing in this field.

System testing should include not only those functions processed within the EBT system but also those functions requiring interfaces with other systems. Early testing of the interfaces that involve transfers of benefits -- issuance and retailer crediting -- is especially important. Postponing testing of these functions until the acceptance test could cause serious delays in system implementation. The testing of interfaces with outside institutions, such as the clearinghouse bank, the Federal Reserve, and FNS, also provides a vehicle for clarifying protocols for system operations.

The involvement of State technical and program staff becomes more and more desirable as development enters the system testing stage. This involvement should include not only the design team but also key operations staff. The latter group should be involved so that they become familiar with the roles they will play in acceptance testing and implementation. The additional perspective of system analysts, operations managers, and program staff also may help identify problems before they cause serious delays.

PDPW technical staff found that they learned a great deal about the EBT system when the test version of the on-line software was delivered. They used the system testing process not only to check for flaws, but also to examine how the system worked. However, the fact that system testing came relatively late in the development phase meant that the State staff were still building their expertise at the time of the acceptance test.

The development team and the State staff with ultimate responsibility for the project should take particular note of those functions which are excluded or simulated in system testing and functional demonstrations. These functions should be targeted for careful scrutiny in the acceptance test. Project staff should consider what action may be required if these functions do not operate properly. For example, the transmission of a full monthly issuance file from the PDPW data center to the EBT Center was not included in the functional demonstration for the PRC system. PDPW and PRC later

discovered that telephone transmission of this file took several hours; as a result, a procedure had to be established to deliver the issuance file on tape.

DOCUMENTING SYSTEM DESIGN AND OPERATING PROCEDURES

The EBT system development team must document the final system design and the procedures required to operate the system. The documentation needs to update detailed design where changes have been made during development and testing. Accurate documentation is needed for a number of reasons, including: the preparation of training materials and acceptance test scripts; resolution of problems identified during acceptance testing, implementation, or live operations; and future system expansion or enhancements. The lack of updated documentation on the PRC system was an obstacle to PDPW during the takeover of the PRC system and during the development of the PDPW system.

Sound operating procedures are as important to an EBT system as proper functioning of the hardware and software. Procedures for all participating groups must be formulated and documented. These groups include:

- State data center personnel;
- local welfare office staff and other State personnel;
- retailers;
- recipient households and their authorized representatives;
- participating financial institutions, including the clearinghouse bank, the Federal Reserve system, and retailers' banks;
- participating FNS units, including Field Offices, the Regional Office, and the Minneapolis Computer Services Center; and
- system managers.

State Data Center Procedures. These procedures should cover system batch functions, system backup and file maintenance, interface with other State data processing systems, equipment service, and crash recovery. The development team and data center managers should allocate responsibility for these tasks among the units of the data center organization with attention to

each unit's capabilities and workload. In devising the procedures, some of the issues that should be considered are:

- How will the procedures affect skill requirements and staffing levels needed in each unit?
- How do the procedures affect the security of critical files, software and documents?
- What are the scheduling requirements for the EBT system, and how do they interact with other production schedules?
- What procedures are necessary to ensure system reliability in accordance with the performance standards? What special procedures are needed to ensure proper crash recovery?
- How can procedures be made as easy as possible to execute? What procedures are likely to be prone to errors or short-cuts, and how can these be prevented?
- What procedures will require special attention in training?

Procedures for the State data center should be established through an in-depth dialogue between the development team and the managers who will be responsible for system operations. This approach will ensure that procedures are practical, and that the operations managers understand and accept them. Program staff also should participate to provide input on how the data center procedures may affect program operations (such as card encoding, which may affect the scheduling of batch operations). In these discussions, the development team and program staff should stress that while the EBT system may be small in terms of data center operations, it can have a large impact on the recipients and retailers who depend on it.

Local Welfare Office Procedures. Formulating local welfare office procedures for EBT system operations should follow the basic path of consultation outlined above. The procedures required will depend on the exact system design, but the basic areas will include: recipient account initialization, card encoding and training; benefit issuance procedures, including expedited and supplemental issuances; resolution of recipient problems; maintenance of special EBT equipment and supplies; and coordination with the State data center. Consultation on these procedures should include State-level

staff responsible for local welfare office operations and local-level managers and supervisors. The discussions of local office procedures should address the allocation of responsibility for EBT functions and their impact on the workload of local staff.

Retailer Procedures. The retailer procedures needed for an EBT system are extensive. Responsibilities must be assigned and procedures established for the functions to be performed or coordinated by EBT operating staff. These activities include retailer enrollment, installation of equipment, training, permission for ACH transfers, equipment service, provision of supplies, treatment of inactive retailers, and removal of retailers from the EBT system. If retailer interface functions are divided between different units (such as the PDPW hotline, which is covered by BCAO during weekdays and by HSH staff at other times), the procedures must identify the responsibilities of each unit and mechanisms for coordination. The retailer service procedures must meet FNS requirements for ensuring that authorized retailers (and only authorized retailers) can participate. Retailers' needs, such as the desire for quick start-up and dependence on properly functioning equipment, must be taken into account to ensure cooperation.

The procedures should lay out what retailers must do to perform their functions in the EBT system. Retailer representatives should be consulted in preparing procedures for normal system transactions, back-up purchase mechanisms, and problem resolution (e.g., by incorporating retailer procedures in the retailer design summary and discussing them during the design review process). This consultation will help ensure that the procedures are feasible and that the retailers will accept them.

Financial Institutions and FNS Procedures. Draft procedures for interfaces with participating financial institutions and FNS units should be presented to the appropriate officials for comment and approval. These organizations should be made aware of how they fit into overall EBT system operations and how their participation may affect their institutions. This consultation process should also address the activities required for the transition to EBT system operations, such as advance notification of the system start-up date.

System Management Procedures. These procedures are particularly important in an integrated EBT system, which will require coordination among

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Once the State's responsibilities for system implementation are identified, tasks should be assigned to specific units within the State Agency. These units may include the State's program oversight unit, the data center, and local welfare offices. The management plan should identify requirements for coordination among units.

If a turn-key contract calls for the developer to implement the system and operate it during start-up, it is appropriate for the contractor to take the lead in the preparations for implementation. (PRC played this role in the original Reading demonstration, with the cooperation of PDPW, BCAO, FNS and the clearinghouse bank.) The State, however, will need to oversee and facilitate the preparations made by the contractor. The contractor will need access to various State personnel (such as data center managers) during preparations for implementation. State personnel may have to serve as liaison with FNS and other outside parties, because of the State's ultimate responsibility to FNS for the management of the project.

If the State plans to operate the EBT system from the beginning, it should play a substantial role in planning and executing system implementation. By participating in the discussion of implementation issues, State staff can ensure that they understand the EBT system's impact on other State operations and the necessary interfaces between the EBT system and outside institutions. The State needs to establish credibility and lines of communication with retailers to maintain their cooperation, so State staff should, if possible, take the lead in recruiting retailers. Participation of key State staff in implementation planning will also reinforce their understanding of how the system operates and provide an additional check on any oversights or problems in the execution of the system design.

SCHEDULING SYSTEM IMPLEMENTATION

The number of interrelated tasks that must be accomplished to implement an EBT system puts a premium on careful scheduling. The implementation schedule must be comprehensive, and it should identify potential bottlenecks that may result from problems with critical tasks. The schedule should include:

- installation of hardware, telephone lines, and production software (including the time, staff, supplies and equipment required);

- acceptance testing (and additional tests of the production system, such as tests of retailer equipment not used for the acceptance test);
- training of staff, recipients, retailers, and other participants; and
- initiation of system operations.

Installation of Equipment. The plans for equipment and telephone line installation should include:

- equipping retailers;
- establishing sites for recipient training and other EBT functions (such as the retailer hotline) at participating local welfare offices;
- installing telecommunications links between the project area and the State data center;
- equipment preparations for system operations at the State data center;
- establishment of new facilities needed, such as a base for store equipment servicing; and
- installation of coupon dispensers (if included in the design).

The plans should address timing issues, including how long each task will take, when it must be completed, and what tasks will be affected if it is delayed. For example, the ordering of POS equipment should allow for delays in delivery to avoid delays in installation. Installation of POS equipment should not be planned for busy holiday shopping periods, to avoid adverse impact on retailers' operations. The plans should provide for necessary coordination with outside parties, such as the POS equipment service contractor and telephone and electric companies.

In addition, the logistical requirements for all equipment installations must be addressed, including equipment configurations, physical layouts of installation sites, requirements for electricity and other services, and special equipment needed for installation (mounting brackets, etc.). Installation plans should take into account the security features available at each site and any additional protections (locks, etc.) that should be installed.

Retailer equipment installation will require a substantial planning effort because of the number and diversity of the sites. PRC had to equip 110 stores in less than two months. Each retailer site has different requirements for POS equipment installation, including the number of checkout counters, new telephone lines or extensions, power supplies for the equipment, mounting arrangements for the terminals, and provision for separate balance inquiry devices (if applicable). These requirements must be determined by an on-site retailer needs survey, as described later in this section. However, preliminary information for planning purposes can be obtained via a mail or telephone survey.

The implementation plan should specify the number of POS terminals needed and how they will be allocated. If all checkout lanes will be equipped, a count based on a retailer needs survey will be sufficient. Otherwise, the planners must arrive at a number of terminals that will provide acceptable service within the limits imposed by the available funds for operating costs (including the FNS reimbursement cap). A queueing model or similar approach should be used to simulate the amount of waiting time by recipients and other customers during peak transaction periods under different levels of terminal deployment, using design assumptions regarding redemption volume, transaction times, and issuance schedules. Such an analysis will help the State make (or ratify) the necessary policy decision about the acceptable level of waiting time.

Once the total number of terminals is determined, the planners must create a formula for terminal allocation among participating stores. The principal factors should be the store's redemption volume and its number of checkout lanes. However, special circumstances may have to supercede the general formula. For example, some types of stores (such as military commissaries) have a single line for all checkout lanes, so that each customer can be served by the next available clerk. This configuration requires that all lanes be equipped, because EBT system users cannot be forced to wait until an EBT-equipped lane is available.

Before the terminal deployment plan is finalized, it should be submitted to retailers (or their representatives) for review. Retailers who will not get all lanes equipped (especially supermarkets and large grocery stores) are likely to object. The State and/or the vendor should be prepared

to respond to these objections; options include persuasion of key opponents, increasing the number of terminals, changing the allocation formula, and finding another concession that will satisfy the retailers at a lower cost.

Acceptance Testing. The implementation plan need not include a detailed acceptance test schedule, because that document will be prepared separately (as discussed in Chapter 5). However, the overall implementation schedule should include the planned timing of the acceptance test, documentation and evaluation of test results, "go/no go" decision-making, and alternate dates for implementation depending on whether further development and testing will be required. In addition, the acceptance test will not include all retailer sites, and some other equipment (typically workstations and training terminals at some welfare offices) may be excluded from the test. The implementation plan should provide for some form of testing this equipment as it is installed.

Training. The implementation schedule should include all necessary training of system participants, including State staff, recipients, retailers, FNS staff, and retailer service personnel (if this function is contracted out). This schedule should take into account when each group should be trained, the number of trainees in each group, and the logistics of each type of training.

System Initiation. The plans for system start-up should reflect several considerations. Two issues are how retailers and recipients will be phased into system operations.

To avoid giving some retailers an advantage over nearby competitors, all retailers in the system's pilot area should be equipped and trained before start-up. However, recipients' need to shop in areas adjacent to the pilot site may emerge after start-up, making it necessary to equip and train additional retailers. Like POS terminal installation and retailer training, start-up should not coincide with the holiday shopping season.

Recipients in the system's pilot area can be trained immediately after system start-up. A phase-in of recipients may be desirable, both to reduce the demand on training resources and to bring the system up to full load gradually. (For instance, PDPW conducted recipient training for the original portion of the Reading demonstration in three waves.) Thereafter, as

retailers in other areas are brought into the system, recipients who shop in these areas can be trained.

The plans for system start-up should be designed to minimize the inevitable confusion that will accompany the introduction of an EBT system. All participants, including recipients, retailers and banks, should receive clear, advance notification of the start-up date and the implications of the new system for them. Staffing plans should take into account both the expected requirements for steady-state operations and the extra staff needed during start-up to ensure proper operations. The State may wish to station staff in the stores to assist recipients and retailers during early operations, as FNS did in the original Reading demonstration. Start-up plans should target sensitive areas of system operations (such as retailer equipment malfunctioning and daily production schedules) that will be closely monitored.

CONTINGENCY PLANS

Preparations for implementing an EBT system should include contingency plans for responding to system failure. Planners should identify the possible failures that could affect critical functions, including benefit posting, transaction processing, ACH tape processing, and reconciliation. The main fall-back option in the event of a system break-down is to issue coupons to recipients. The contingency plans should provide for a mechanism to retrieve recipient balance data, generate an authorization file, and issue coupons as quickly as possible, to avoid depriving recipients of access to benefits. These plans must address technical problems of benefit conversion to coupons, such as the handling of balances of less than $1.

PLANNING TRAINING AND PREPARING TRAINING MATERIALS

The preparations for training participant groups constitute a major part of the effort required to prepare for implementing an EBT system. Training plans and materials must be produced for a wide variety of audiences, including State staff, recipients, retailers, and other groups. The State or the contractor must create lesson plans, handouts, and other materials for training. For each type of training, the logistics to be considered include: who will perform the training; where and when will it occur; how many people must be trained; and how many can be trained at one time.

Training should be scheduled to minimize inconvenience to participants and interference with the EBT system or other operations.

The preparations for training should take into account both the start-up requirements and those of ongoing EBT operations. It may be desirable to use special trainers during start-up to ensure effective training, especially when working with recipients. PDPW used State-level program staff with extensive training experience during implementation of the PRC system. On the other hand, training in some areas (such as computer operations) should be provided by those who will be supervising the trainees. The training materials should be designed so that they can be used effectively by both special trainers and the regular staff who will be conducting training once the system has reached steady-state.

The requirements for training State staff will depend on the division of labor for implementation and operations. The first training requirement is to train any staff who must conduct training during implementation. Other groups to be trained may include: managers and supervisors, operators, other data center staff, analysts supporting the system, hotline staff, caseworkers, clerks, and store equipment service technicians. Plans for training contractor staff who will participate in system operations also must be formulated.

The planning of retailer training should take into account the voluntary nature of retailer participation and the cost of training to retailers. Bringing retailers together to a central site (as PRC did) may be more efficient and less intrusive on retailers' operations, but retailers will be reluctant to send more than one or two staff off-site. Thus, the State should consider the possibility of on-site training, especially for larger stores with many clerks. Retailer training (whether on-site or at a central location) should include thorough instructions on how to use the EBT equipment, discussion of how to handle problems that may be encountered (e.g., system inaccessibility, equipment failure, recipients who have trouble remembering their PINs or insufficient balances to make a purchase), and hands-on practice using the equipment for various system functions (e.g., balance inquiries, purchases and refunds).

The State should pay special attention to the preparation of the retailer training materials. Retailers should receive a concise, thorough and

accurate manual, accompanied by additional, easy-to-use guides suitable for posting at checkout counters (such as a quick reference sheet and a trouble-shooting guide). Special materials may be needed for some retailer groups, such as non-English speakers and those who cannot use normal purchase procedures. The latter group includes retailers who must use manual authorization procedures for all EBT sales because they do not have EBT terminals (e.g., dairy delivery services).

Recipient training plans and materials should be responsive to the needs and abilities of the project area caseload. Materials in languages other than English or special formats for disabled persons may be needed. The use of a video explaining how to use the EBT system, such as the one prepared for the original Reading demonstration, can be particularly effective with an audience of food stamp recipients; hands-on practice is imperative. Features of the system that are likely to cause problems, such as remembering the PIN and tracking balances, should be targeted for emphasis.

During the start-up period, the State should be sure to use experienced trainers who understand the EBT system well, so that recipients will be as prepared as possible to use the system. In working with some populations, the collaboration of community groups may be valuable, especially if these groups can provide ongoing support after start-up (such as volunteers to serve as authorized representatives for disabled persons).

Recipient training plans should be consistent with applicable State and FNS regulations. Recipients must be given adequate notification, and the State needs to formulate procedures for notifying recipients of non-compliance with training requirements and processing adverse actions on these grounds.

The large numbers of recipients who must be issued cards and trained make the logistics of recipient training an important consideration. The State should determine its effective training capacity and plan accordingly. As noted earlier, recipient training may have to be staggered over several months. Some training tasks, however, can be done in advance: for example, BCAO issued photo IDs several months before the planned system start-up, to reduce the effort required when recipients came in for training. Advance notice to recipients explaining the changes to come and plans for implementation can help make recipient training a more orderly, less confusing process for recipients and staff alike. Publicizing the introduction of the EBT

system in local media outlets can also serve to inform both recipients and the general population about upcoming changes in payment procedures at local food stores.

RECRUITING RETAILERS

Recipients' opportunities for using an EBT system will be limited if a substantial number of program-authorized retailers choose not to participate in the system. Thus, the State or its contractor should begin recruiting retailers for system participation as soon as possible. Early in the design stage, retailers should be informed about the State's plans through a variety of media, including mailings, press releases, and informational meetings. A survey of retailers' level of interest and concerns may be useful. The level of response to this publicity may be low, but it may be possible to enhance retailer interest by securing the cooperation of food retailer organizations at the local or state level. If resources permit, one-to-one contacts with supermarket executives and other key figures will prove very useful in generating interest and establishing lines of communication. States should also consider working through retailer organizations and other contacts to establish a task force or focus group to serve as the liaison between the EBT project and the retailer community.

As discussed in Chapter 3, retailer input on the system design is important. The issues raised during the initial promotional effort should be relayed to those responsible for the system design. More formal channels for input can include: review of select sections of the draft design (or a separate retailer design document, if prepared) by a retailer task force; distribution of design information to all retailers, followed by public question-and-answer sessions; and attendance by a few retailer representatives at the functional demonstration. Retailers should also be informed about relevant aspects of the implementation plan, especially terminal allocation, training provisions, and the implementation schedule. Before opening up the dialogue on these subjects, the State should be clear on where it can or cannot compromise and how it will resolve differences with retailers over the design and implementation plans.

Evidence from the Reading demonstration indicates that retailers perceived the EBT system as an improvement to the Food Stamp Program.

Nevertheless, the State should not view retailer acceptance of an EBT system as automatic. Retailer participation in the Reading demonstration was high for a number of reasons. PRC began recruiting retailers with a mailing sent out shortly after the contract award. The recruiting effort was aggressive, stressing the benefits of the EBT approach and showing interest in retailers' concerns. PRC succeeded in gaining the retailers' confidence, which it maintained through a high level of contact and service. Finally, retailers risked losing food stamp business if they did not participate. This latter factor, however, may not have been enough of an inducement for system participation without PRC's recruiting efforts, especially for stores with a limited number of food stamp customers.

The State may need to collaborate with FNS on retailer recruiting. FNS possesses a comprehensive data base of participating retailers that can be used for mailings, as was done in Reading. The Regional Office may need to send out notices to retailers on behalf of the agency. The State should confirm with FNS (presumably through the Field Office) that the retailers requesting participation are authorized to accept food stamp benefits.

Recruiting materials should be as clear as possible on where the boundaries of the project area lie, and identify any retailers that will be excluded or handled differently. The State or its contractor should be prepared to deal with retailers on the boundary who protest their exclusion. One response to this problem is to expand the area, but this approach will add to the cost and time for implementation. Another approach, as discussed in Chapter 3, is to permit retailers in boundary areas to use alternative purchase procedures. Either of these approaches could cause problems if adopted late in the development process, so the boundaries for initial implementation should be established during the design stage.

A critical part of the recruiting effort is the drafting of the agreement between the retailer and the system operator. This agreement needs to clearly spell out each party's rights and responsibilities in such areas as POS equipment deployment and service, telephone and electrical service for POS devices, liability for manually authorized transactions, system performance, security, and prevention of discrimination against recipients. The agreement should also provide procedures for resolution of disputes and, if necessary, termination of the agreement. Like other key documents involving retailers,

the retailer agreement should be reviewed in draft by retailer representatives.

Once all retailers wishing to participate have been identified, the State or its contractor should conduct a survey to determine the requirements for store equipment installation. This survey should, if possible, be conducted on-site by project staff, so that the data will be as accurate as possible. The site survey should determine all requirements for equipping each store, including the number of terminals, phone lines or extensions needed, power sources available at checkout counters, and placement of terminals.

ESTABLISHING NECESSARY AGREEMENTS

The State or its contractor must ensure that all agreements required for system implementation and operation are in place before the planned start-up date. In addition to the retailer contract, agreements with the clearinghouse bank for ACH settlement and with FNS for monitoring drawdowns of program funds will be needed. If the servicing of store equipment is to be contracted out, this agreement should be established in time for the training of service personnel. Finally, new equipment installed at local welfare offices and the State data center may require the establishment of new maintenance contracts.

Negotiations on necessary agreements should begin well in advance of the desired start-up date, to allow time for internal review of the terms and discussions between the parties involved. It will be easier to establish formal agreements for participation if the State has consulted with the other parties during the design stage. These parties also should be kept abreast of design changes affecting them, and they should be consulted on procedures affecting them (as discussed in Section 4.2).

The clearinghouse institution should be identified early in the design phase, so that it can provide necessary input into the design of the settlement process (as discussed in Chapter 3). The State may be able (or required) to incorporate the EBT clearinghouse function into the existing agreement with its fiscal agent, as PDPW did with Commonwealth National Bank. If a vendor is to operate the EBT system, the vendor may have a similar relationship with an ACH member bank.

The agreement with the clearinghouse institution should address several important issues. This contract should spell out deadlines and procedures for submitting ACH files to the institution, transmission of credits to retailers, and interfacing with the Federal Reserve to debit USDA. The State and the institution should establish mechanisms and identify contacts for resolution of problems. The financial terms of the agreement should include the scope of the institution's responsibility for errors and the reimbursement to the institution for its services.

While an EBT system does not require formal agreements with local banks, their cooperation is important to the system's smooth operation. From the design phase on, local banks should be kept informed by letters and other means of the plans for the EBT system, focusing on how the project will affect them by replacing coupon deposits with ACH entries. This notification is particularly important to smaller banks that may process ACH entries manually from hard-copy listings.

If the State contracts with a vendor for the installation and maintenance of retailer equipment, the agreement should be structured to ensure prompt and satisfactory service. Technicians should be available during prime system operating hours, and adequate provisions should be made for ensuring that stores with more extensive hours have enough working terminals. Standards for response time on requests for installation and service should be written into the contract, together with a recognition of the need for courteous treatment of retailer personnel. The State and the vendor must establish whether retailers will call the State or the vendor when equipment malfunctions, and under what circumstances the operator should attempt to trouble-shoot the problem over the telephone. Finally, the agreement must establish the terms of the vendor's accountability for equipment and supplies, including procedures to document retailers' responsibility for equipment.

In some cases, agreements for services to the EBT system may need to provide for the bonding of employees. For example, a courier service engaged to deliver the ACH tape should be bonded to cover liability for tampering with the tape. If the contractor is to operate the EBT system during start-up, a bond may be required (as it was in the Reading demonstration).

Chapter Five

ACCEPTANCE TESTING FOR AN INTEGRATED EBT SYSTEM

The final step prior to implementation of an integrated EBT system is acceptance testing. The acceptance test is a series of individual tests assessing the EBT system's ability to perform the functions it is designed to accomplish. The test also evaluates the State Agency's organizational and operational readiness (or a contractor's readiness if the system is a turn-key project) to begin implementation activities. Successful completion of the test indicates that the State Agency is ready to accept the system from the developer or -- in a turn-key project -- to authorize the start of implementation activities.

The acceptance test process is composed of five distinct and ordered stages, each of which follows successful completion of the previous stage. The five stages of the acceptance test process are:

- preparing the Acceptance Test Plan;
- preparing the Acceptance Test Scripts;
- executing the tests;
- evaluating test results; and
- retesting (if necessary).

The acceptance test process should be overseen by a task group composed of participants in the system development process (i.e., State Agency program and technical personnel, system developer, consultants, and software vendors) and representatives of major groups affected by EBT system implementation (e.g., FNS, retailers and financial institutions). If a special consultant is being used to head the acceptance test process, that consultant should be a member of the task group. The task group should review or evaluate each stage of the process before the next stage is conducted.

5.1 PREPARING THE ACCEPTANCE TEST PLAN

The first stage in the acceptance test process is preparing the Acceptance Test Plan document. The Acceptance Test Plan prepares a foundation

for writing the detailed test scripts. The document should identify the specific system functions and areas of performance which will be tested. The intent of this document is to develop the approach -- not the detail -- required to execute the tests. Additionally, following approval of the plan by the task group, the Acceptance Test Plan represents an agreement on the scope of the tests, the test requirements in terms of physical preparation, and the responsibilities of each party during the test execution and evaluation stages.

The Acceptance Test Plan should be completed at least ten weeks

therefore, should consider preparing its own Acceptance Test Plan only if agency personnel have the technical expertise, the objectivity, and the time to design a plan which thoroughly tests all system functions.

The third option is to hire an independent consultant to prepare the Acceptance Test Plan, as was done for the PDPW EBT system. The advantage of this approach is that a consultant approaches the test from a more objective perspective than a system developer, and a consultant is likely to have greater technical expertise in POS system operations than State Agency personnel. The main limitations with this option are the time required for the consultant to gain a full understanding of a particular system and the cost associated with that task. Unless the consultant monitors the development process on an ongoing basis (as was the case during PDPW EBT system development) and has ready access to system documentation, the time and effort required to develop a full technical understanding of the system might make this approach impractical.

Considering the relative advantages and disadvantages of assigning test plan preparation to different parties, it probably makes most sense either for State personnel to prepare the test plan (with outside technical consultation, if needed) or for the State Agency to hire a consultant to prepare the plan. If the latter approach is taken, the consultant should review system design documents and monitor system development activities to facilitate the process of preparing the Acceptance Test Plan.

SCOPE OF THE ACCEPTANCE TEST PLAN

Testing Phases. The Acceptance Test Plan should explicitly identify every testing phase (i.e., each aspect of the system which will be tested). System testing phases include functional, performance, and "what-if" phases. The functional phase tests the ability of the system to perform the functions the system is designed to accomplish. The performance phase focuses on how well these functions are performed. In the "what-if" phase, observers can improvise tests on the basis of observations during earlier phases. The test plan should also include a means for evaluating the State's organizational readiness to implement and operate the system.

The following list outlines the primary functional phases (and examples of each) to be covered in the Acceptance Test Plan:

- terminal functions, including PIN verification, communication initialization, message verification and printer functionality;
- card initialization functions, including card encoding and embossing and account initialization;
- workstation functions, including account initialization and queries, manual transaction processing, and control file processing;
- on-line processing, including transaction processing;
- batch processes, including ACH and retailer settlement, system reconciliation and report generation;
- telecommunications, including communications between the EBT Center, store terminals and the hotline workstation; and
- file creation, maintenance and use procedures, including account processing, participation files and issuance posting.

In the performance testing phase, the system tester attempts to assess the day-to-day operating limits of the system. This testing phase consists of three very significant areas: data integrity, stress testing, and back-up and recovery. Data integrity testing focuses on the proper collection and protection of financial data. Stress testing evaluates the system's actual capacity and performance against the standards established in the system design, to see whether it can process large volumes of data without excessive burdens on the system's telecommunications lines and modems, processors, and software, and without degradation of system response times at POS terminals. Back-up and recovery testing attempts to make the system stop processing (as when a power interruption occurs) and evaluates the system's ability to resume operations without loss of data or processing errors. Upon completion of the performance test phase, the tester should have a reasonably accurate expectation of system performance after implementation.

Each system test phase should be presented as a series of ordered steps, with each step representing a particular aspect of the system to be tested. The order of steps is particularly important because test steps may

depend on data constructed in previous steps. Successful completion of one step permits testing to begin on the next step.

A brief description of the test and expected results should be included with each step. To aid the reviewer, the test plan should describe how each step ties in with the major processing flows of the system.

Finally, the Acceptance Test Plan should identify the features to be evaluated when assessing the State's readiness to implement and operate the system. Many of these features were described in Section 4.3 (Preparing for Implementation). They include staff assignments, the preparation of an implementation schedule and contingency plans, the preparation of training plans and materials, the status of retailer recruitment, and the establishment of necessary agreements with outside parties. Other features include the completion of system training by State personnel, documentation for how EBT system operations will be integrated with other data processing functions, and the preparation of a staffing and management plan for system operations.

Test Methodology. The Acceptance Test Plan should outline how the tests will be conducted and how results should be evaluated. Additionally, this section should present basic outlines for any forms which will be used in testing, data requirements for the tests, the format in which specific tests will be presented, and how the overall test is to be completed. Because the EBT system will be integrated into other processing operations, it is very important to discuss how testing can be conducted without interfering with other system applications. If the acceptance test cannot fully replicate integrated processing after system implementation, these limitations should be noted in the test plan. Examples of limitations might be difficulties in replicating a power failure (because of potential adverse consequences for other system applications) and the scheduling of EBT system stress testing to coincide with peak processing periods from other applications.

Test Environment. Although the test scripts will provide a detailed and comprehensive listing of what equipment is needed for each step of the acceptance test, the Acceptance Test Plan should identify the major equipment needs and where each step of the test is to be performed (e.g., at the operations center, at a local welfare office, at a store's EBT terminal). It should also identify the major groups of participants who will be involved with the test.

Test Schedule. A section describing the schedule for preparing test material, actual execution of the test, and evaluation of test results should be presented in the Acceptance Test Plan.

ACCEPTANCE TEST PLAN REVIEW

The Acceptance Test Plan should be reviewed by the entire task group, regardless of which party has prepared the document. Review should focus on technical thoroughness and the assignment of personnel responsibilities for the testing. Following review of this document, all participants in the acceptance test process should have a clear understanding of what will be required of them in preparing for and executing the actual acceptance tests.

5.2 PREPARING ACCEPTANCE TEST SCRIPTS

Following review and comment on the Acceptance Test Plan by all task group members, the Acceptance Test Scripts are prepared. The test scripts are lists of the specific steps which will be conducted during the acceptance test process, and they provide detail for the testing phases described in the Acceptance Test Plan. The test scripts describe how the tests will be conducted, identify the resources necessary for the actual testing, and detail how test results will be recorded and evaluated.

A draft of the test scripts should be submitted at least six weeks before planned system implementation. Final scripts should be ready at least four weeks before the planned start of implementation activities.

OPTIONS FOR TEST SCRIPT PREPARATION

The simplest approach to this task (and the approach taken during the PDPW EBT system acceptance test) would be to have the same party who prepared the Acceptance Test Plan prepare the test scripts. However, the Acceptance Test Scripts present a greater level of technical detail than the Acceptance Test Plan, and they may demand a higher level of expertise than possessed by the preparer of the test plan. A situation like this would most likely arise in a turn-key approach to system development. State Agency personnel might identify the specific functions and areas of performance they would like tested in the Acceptance Test Plan. Actual test script preparation

would then be conducted by a system developer or independent consultant. Transferring responsibility in this manner would allow the State Agency greater control over the acceptance test process, but it could inject time delays and confusion as the two parties work to coordinate efforts.

Preparation of the PDPW EBT Acceptance Test Scripts was complicated by delays in obtaining necessary system documentation from the system developer. Delays in gaining access to this information increased the time between approval of the Acceptance Test Plan and submission of the Acceptance Test Scripts.

ACCEPTANCE TEST SCRIPT OUTLINE

The Acceptance Test Scripts should be composed of four distinct sections: test requirements, initial data values, function tests, and performance tests. Additionally, copies of forms to be used during acceptance testing should be provided in this document.

Test Requirements. The test requirements section should focus on the requirements to complete the acceptance tests defined in the document. This section should include a detailed description of the on-site equipment, personnel and data required to conduct each test, and a testing schedule. To illustrate the level of detail needed in this section, the test of the PDPW EBT system was delayed when participants had to go to a local store to buy a patch cord and adaptor to hook up a terminal.

Initial Data Values. Before acceptance testing begins, test data need to be placed on the system. These data include recipient and retailer accounts, issued benefits for some recipient accounts, and security access data to allow operation of the system by test personnel. The initial data values section of the test scripts should identify required workstation screens for data initialization, procedures to be followed, and data to be entered. The expected results for each initiation procedure should be listed to permit positive verification of the data entered. During the actual test, this step can also evaluate security controls for entering data and accessing data files.

Functional Testing. Section 5.1 described the major system functions which need to be tested. The test scripts should identify the exact

order in which separate functions will be tested and the detailed procedures to be followed in testing each function. For instance, in testing transaction processing, the scripts might include the following procedures:

- sign on a store terminal using a (test) merchant card;
- pass a (test) recipient card through the terminal's card reader and enter a valid PIN; and
- enter a specified purchase amount and transmit to system.

The test scripts should list expected results (e.g., a successfully completed transaction listed in the system's transaction file) to verify the accuracy of completed steps and to assist in the isolation of discrepancies should they develop. Estimates of the time required to complete each step are recommended to monitor the progress of the acceptance test.

Possible complications to the testing process should be identified for each testing phase. For example, terminal testing at remote locations will need on-site personnel and communications to coordinate the testing process.

Performance Testing. Performance testing scripts should follow a similar format to that used for functional testing. Each test phase should be described in terms of a detailed sequence of steps. Similarly, expected results, completion time and potential complications to the testing process should be identified for each testing phase.

Whoever prepares the Acceptance Test Scripts should be aware of the high level of detail required in the scripts and the effort that will be needed to prepare the scripts. The Acceptance Test Scripts for the PDPW EBT system included over 300 pages of text, tables, and forms; approximately 35 person-days were spent preparing the script. To indicate the level of detail in the scripts, Appendix B replicates a portion of the test script for one functional test (benefit issuance). The appendix shows test sections covering resource requirements, test procedures, expected results, and data tables.

The test scripts for the PDPW EBT acceptance test were quite detailed, in contrast to those for the acceptance test of the PRC EBT system. PRC personnel knew the resources and procedures required for each test step, and they did not feel a need to document all the information beforehand. If the system developer is not designing and conducting the

acceptance test, however, the test scripts will need to approach the detail shown in Appendix B. This detail will allow test participants to fully recognize required test resources and procedures.

"What-If" Testing. In addition to the pre-scripted portions of the acceptance test, provisions should be made to permit "what-if" testing. Observers should have the opportunity to perform tests based on situations that were not anticipated in the scripts but have come to the observers' attention during the test. For example, an observer might try introducing errors in the entry of data on a workstation screen, simulating what an inexperienced user might do (hitting the wrong function key, etc.). If possible, "what-if" testing should be allowed throughout the acceptance test. If the schedule does not permit this, a period of time should be allowed after the completion of the scripted tests. Test planners should take care to determine what limits should be placed on "what-if" testing to avoid disruption of the overall testing schedule and negative impacts on the system or the test environment.

State Readiness. Unlike functional and performance testing, there may be no actual "scripts" for evaluating the State's readiness to implement and operate the system. Rather, a checklist can be included which lists all the tasks needing to be completed prior to implementation.

5.3 PREPARING FOR THE ACCEPTANCE TEST

Chapter 4 addressed equipment requirements in preparation for the acceptance test. In addition to having the necessary equipment in place, the Acceptance Test Scripts should identify other necessary preparations for the test. These other requirements include the availability of appropriate personnel to conduct each testing phase, needed forms, required file availability, and a list of outside participants needed during the testing process (e.g., retailers, recipients, bank personnel, FNS Minneapolis Computer Support Center, etc.)

Everyone who will participate in the test must understand his or her responsibilities. If special training is needed (i.e., for system operators, recipients or retailers), this training should be completed before the test. Benefits must be authorized to recipient accounts if recipients will use food stamp benefits to purchase groceries during the test.

State Agency involvement in preparing for the acceptance test will vary depending on who is responsible for preparing the test scripts and conducting the test. At a minimum, the State Agency will serve as a liaison to an outside party and coordinate the preparations according to those outlined in the test scripts. The State Agency will be responsible for all acceptance test preparations if it chooses to execute the test.

5.4 CONDUCTING THE ACCEPTANCE TEST

Since the acceptance test is the final test of the system before food stamp benefits are distributed to recipients and used to purchase groceries, the test should mirror the system's planned operating environment as much as possible. Functions to be performed by food stamp authorities and local financial institutions during operations should be handled by these same groups during the test. Special staff may have to be used to execute some critical functions (such as back-up and recovery) to permit timely testing.

Based on the acceptance tests of the PRC and PDPW EBT systems, from three to five days may be needed to conduct the acceptance test. The actual duration will depend on the extensiveness of the test and possible complications which may arise during test execution. The Acceptance Test Scripts should specify the expected test duration. Insofar as possible, test schedules should anticipate complications and reflect a realistic timetable.

OPTIONS FOR CONDUCTING THE ACCEPTANCE TESTS

The easiest approach to the acceptance test process would have the same party construct and perform the test, whether that party is the system developer, the State Agency, or an independent consultant. This approach would minimize problems coordinating test personnel, and it would facilitate preparations for the test because the acceptance test writer knows exactly what is required to complete the tests. At a minimum, the party which prepared the Acceptance Test Scripts should monitor or supervise the testing. On-site availability of the test writer will facilitate the testing process by ensuring accurate execution of the test and by clarifying any confusion which might develop over testing procedures.

Having the system developer conduct the acceptance test carries with it many of the same advantages that were identified with acceptance test

writing by the system developer: greatest knowledge of system operations and easiest access to system documentation and other system-related resources. As with acceptance test writing, however, an acceptance test conducted by the system developer may compromise the objectivity of the testing process. Testing deficiencies viewed as serious by system users might be considered less so by the system developer. Moreover, having the system developer conduct the test is not likely to mirror the true environment under which the system will operate. Problems can develop after the system becomes operational if the response of the system to likely user errors is not tested.

Having State Agency program and technical personnel conduct the acceptance test offers several advantages. Replicating the true operational environment of the system will provide hands-on training and could identify possible system problems when system users perform their responsibilities. This approach might present greater logistical problems (scheduling all participants, preparation, etc.) than having the developer or a consultant conduct the test, but the "dress rehearsal" aspect of system users performing the acceptance test is highly desirable.

Having a consultant in a supervisory role will inject greater credibility and objectivity into the testing process than using the system developer in this role. These two qualities are particularly important when making the decision to proceed or delay with system implementation plans. An outside consultant has no stake in the State's acceptance of the system or in the impact of test discrepancies on development costs.

TESTING DISCREPANCIES

The acceptance test for the PDPW EBT system classified all errors or problems encountered as having one of four levels of seriousness: those that stopped all further testing until resolved, those severely impairing the testing process, those impairing the testing process, and those involving an error in presentation but not in function. All discrepancies discovered in testing were logged on forms that included the part of the test where the discrepancy occurred, a description of the discrepancy, and the classification. These forms also provided space for documenting the fixes made and the results of retesting, if required. This approach made it easier to evaluate test results, and it provided a clear set of priorities for taking action.

Discrepancies that stop further testing affect both the test step being evaluated and all subsequent test steps. That is, no further testing of any component of the system can be done until the discrepancy is resolved. Such discrepancies could be difficult or easy to fix. For instance, a major software error might require postponement of the acceptance test until the software has been reprogrammed. In the PDPW EBT Acceptance Test, however, all discrepancies of this nature were quickly resolved. One involved replacing several modems, another involved an initialization error of a non-financial data field, and a third required replacement of the POS terminal used for the test.

A "testing severely impaired" condition occurs when further testing of a particular system function may not proceed, but testing may continue on the remainder of the system. The function must be reactivated either by system commands or by a programming change. An example of this type of discrepancy occurred with the reconciliation reports generated during the PDPW EBT Acceptance Test. Issuance information was not displayed correctly, and some data fields were incorrectly formatted. These discrepancies required programming modifications and were not resolved by the time the initial acceptance test was over.

A "testing impaired" discrepancy refers to an error on a "minor" function such that further testing of that function cannot be accomplished. However, testing of all major functional areas may continue. During the PDPW EBT Acceptance Test, a testing impaired discrepancy occurred when a decimal point on an amount field was improperly formatted. This discrepancy misrepresented the proper total and required modification in the controlling software. The test step was later reconducted to verify resolution of the discrepancy.

A "testing correction" discrepancy refers to the occurrence of a condition where there is an error in definition. The data are not presented as specified, but the information is understandable. Zero amounts represented as blanks on workstation screens warranted designation as a testing correction discrepancy during the PDPW EBT Acceptance Test. This discrepancy required software modification and retesting.

5.5 EVALUATING TEST RESULTS

An evaluation of acceptance test results should be conducted immediately following completion of the test. All participants in the testing process should be included in evaluation discussions. Evaluation should focus on technical and organizational issues identified during the testing process.

Evaluation of technical issues should focus on the frequency and seriousness of test discrepancies. Each test discrepancy should be assessed and addressed during the review process. Participants in the review should formulate an overall assessment of the technical results and their implications for the acceptability of the system as tested.

The task group should evaluate the State's organizational readiness to implement the system. This evaluation can be based on a checklist of tasks to be completed. If some tasks have not yet been completed (e.g., retailer training), the group should assess whether the State's timetable for completing these tasks is realistic.

If the State plans to operate the system immediately after implementation, the task group should determine whether the staff who will operate the system fully understand all system functions and operating procedures. Similarly, if a contractor will operate the system, the task group must evaluate the contractor's readiness. This evaluation can be based on whether or not operating staff have been trained, whether or not they operated the system properly during the acceptance test, and how prepared they were to resolve any problems that may have developed during the test. Finally, this assessment should include a review of staffing plans and the documentation of system operating procedures.

Of equal concern is the organization's preparedness for rare but potentially disastrous circumstances (e.g., power outages, telecommunications interruptions, etc.). The development of contingency plans are essential to preparations for system implementation. An appropriate and timely response to unexpected events is needed to guarantee a successful implementation and to develop the confidence of system participants.

Following completion of evaluation discussions, a document presenting evaluation results should be prepared by the individuals responsible for conducting the test. This document should present overall test results, summaries of individual test sections, and descriptions of each test discrepancy encountered during the testing process. The document should also include an overall assessment of whether the system is ready for implementation, with discussion of the potential consequences of proceeding with implementation. For example, the document might conclude that all system components have been tested successfully, but that operations should begin on a small scale until the processing capacity of the system is expanded.

A decision to proceed with or delay system implementation should be made by the task group following review of this document. The final decision must be made by State Agency personnel with FNS approval, but they should carefully consider the recommendation of each member of the group. Because problems after implementation can quickly erode the confidence of system participants (specially retailers and recipients), the State should be very confident that implementation can proceed smoothly before implementing the system.

Between one and two weeks should be allowed for this stage in the test process. The actual length of this stage will depend on the successfulness of the testing, but should be sufficient to allow a thorough evaluation of the testing results.

5.6 PROBLEM RESOLUTION AND RETESTING

Following completion of the acceptance test, the outstanding discrepancies identified during the testing process should be compiled, and work should begin on resolving the errors. Following resolution of an error, the test section which identified the discrepancy should be repeated to ensure satisfactory results. Testing should continue until all discrepancies have been resolved.

Some outstanding discrepancies need not necessarily prevent system implementation. Discrepancies like the presentation of blanks instead of zeros on some workstation screen data fields may not impair the ability of the system to perform its required functions, and they may be left unresolved prior to system implementation (as long as workstation operations are notified

of the discrepancy). All discrepancies, however, should eventually be addressed. During the evaluation of test results, the task group should reach consensus on which discrepancies can be left unresolved until after system implementation. A schedule for when discrepancies will be resolved should be prepared and included in the document presenting evaluation results.

When a system component is modified -- even by a minor change such as presenting zeroes instead of blanks -- all potentially affected parts of the system should be retested. Errors in a minor fix can introduce major problems if undetected. To make sure that all system fixes have been done properly, it may be necessary to repeat the acceptance test, or at least major portions of the test. If fixes are made after system implementation, the necessary tests should be performed in a separate test environment before the modified software is put into production.

Chapter Six

IMPLEMENTING AN INTEGRATED EBT SYSTEM

Implementation is the ultimate test of an EBT system's design and development. When the EBT system goes into live operation, system operators become responsible for the delivery of recipients' benefits as well as retailers' and banks' redemptions. Problems in live system operations can have adverse consequences not only for FSP participants, but also for other segments of the public.

The implementation of an EBT system is more complicated to manage than its design, development, or testing because of the large numbers of people involved. The day-to-day operations of an EBT system may involve thousands of people, including recipients, retailers, and operations staff -- all of whom must be trained and equipped to perform their functions. In addition, careful attention must be paid to coordinating implementation efforts, because these efforts are diffused among data center units, local welfare office units, and contractors.

The implementation of an EBT system requires a number of distinct stages of activity. First, the data center must be equipped, staffed, and organized for operations. Next, all field sites (including stores, welfare offices, maintenance sites, and the clearinghouse bank) must be prepared for system operations. Once the center and field sites are ready, the start-up tasks can begin: notifying participants of the start-up date, loading benefits and account data on the system data base, training recipients, and live processing. Throughout this period, it is important to maintain communications and coordination with all participant groups, especially retailers and banks.

Start-up may be followed by a phase-in period in which additional recipients (and possibly retailers) are added to the system. During this time, the EBT system will go through a "shake-down" process in which problems not identified by testing may surface and require attention. Eventually, the EBT system will reach steady-state operations in the pilot area. If the results of pilot operations are positive, the final stage of EBT system implementation will be expansion to the larger planned service area.

Although many tasks during implementation do not overlap with other design, development, and testing activities, there is certainly some continuity present. Interactions with retailers and financial institutions, for instance, represent a culmination of meetings that begin with these groups as early as the design stage. In addition, as discussed in Chapter 4, preparations for system implementation should begin during the system development stage. The conceptual timeline presented in Appendix A shows how implementation activities fit into the overall process of establishing an EBT system.

There are two key considerations for a State that is implementing an integrated EBT system. First, when does the State take over responsibility from the system developer? Second, what are the requirements for successful implementation of an integrated EBT system? These questions are addressed in the following sections.

6.1 APPROACHES TO IMPLEMENTING AN INTEGRATED EBT SYSTEM

Unless an EBT system has been developed entirely in-house, system implementation will require a transition from reliance on the developer to full State control. This transition requires a transfer of expertise about how the system operates. A State's approach to EBT system implementation will determine when and how the transition occurs.

As discussed in Chapter 4, a State might choose either of two basic approaches in planning for EBT system implementation. Under the turn-key approach, the developer implements and operates the system, then turns it over to the State once operations have stabilized. Even in this approach, some implementation tasks (such as training recipients) may be performed by State personnel. In addition, State project staff will have to oversee the developer's performance, much as FNS did during PRC's implementation and operation of the original EBT system.

A State's management responsibilities increase if State personnel implement the EBT system. State staff will need to track the execution of the full array of implementation tasks, which may involve many parties. The implementation phase also involves more intensive activity than normal operations, so the timing of each activity is critical to the overall schedule. Finally, staff supervising the data center need to be prepared to deal with system problems uncovered during operations, establish who is responsible, and ensure that problems are resolved as expeditiously as possible.

To meet these management responsibilities, a State needs to have senior technical and program staff available to provide full-time project management. These staff must have adequate backgrounds in POS operations. Ideally, they should have been involved in the project from the design stage on. While staff turnover may make this difficult, there should be as much continuity as possible from the design and development stages to the implementation stage.

An additional challenge that State staff will face if they assume full responsibility for EBT system implementation is establishing a working relationship with system participants. While the formal operating procedures and agreements governing participation should be established during the preparations for implementation, the way in which they are actually applied may have a significant impact on system operations. The working relationship with retailers is particularly important, given their pivotal role in benefit redemption. Through their interactions with retailers, the staff who operate the EBT system during start-up will establish expectations of the level of service and the scope of retailers' responsibilities. The EBT staff should be especially responsive to retailers' complaints during the start-up and phase-in periods, which will be the most difficult time for system operations. The EBT staff also need to establish effective working relationships with recipients, banks, and FNS officials involved with the system.

A State that successfully assumes responsibility early in the implementation stage can reap long-run benefits. The sooner State staff become involved with the operational details of the EBT system, the sooner they will build the expertise needed to run it effectively. The State will also establish greater credibility with system participants if it makes an effective contribution to implementation. Finally, the cost of implementation is likely to be lower if most of the effort is provided by State staff, given contractors' salary, overhead, and fee structures.

In choosing the role it will play in implementation, a State should weigh the potential advantages of each option against the short- and long-term implications. The choice is likely to hinge on the level of the State's expertise (based on the State's role in earlier phases) and the availability of the necessary organizational resources, including top managers' time as well as line staff.

Any State implementation team, no matter how qualified, will require solid support from the developer. At a minimum, the developer must be able to provide in-depth training for the implementation team, other key management staff, and State staff who will train other participants. Key technical staff from the developer's project team should be available on-site during start-up and early operations. The developer should provide complete, up-to-date documentation of the production version of the system, incorporating any changes made as a result of acceptance testing.

Another important dimension of a State's approach to EBT system implementation is the way in which retailers and recipients are phased into system operations. The rate at which these participants can be added depends on the State's (or contractor's) capacity to equip and train retailers and recipients. Unless the pilot area is quite small (i.e., with 1,000 recipients or less), the State probably will want to stagger recipient training over several months to maintain timely delivery of benefits (as discussed in Chapter 4). If the area is very large and resources are limited, some staggering of retailer installation and training also may be necessary to avoid delays between training and EBT operations, although this would complicate implementation by necessitating explanations to recipients about where they can and cannot make EBT purchases.

While the implementation plan should set forth the schedule for phase-in, the State (or the developer, in a turn-key project) may have to deviate from the plan if serious problems are encountered. In the Reading demonstration, for instance, PRC, PDPW and FNS agreed to delay training the last of three waves of recipients so that PRC could develop solutions to early reliability and capacity problems. Phase-in of non-essential features can be delayed to focus effort on more basic needs, such as resolving significant problems. For example, PDPW delayed training retailers in new settlement options offered by the redesigned EBT system so that staff could concentrate on improving reconciliation report software. Finally, the implementation team will want to monitor system performance with special care during phase-in, so that it can respond promptly to any problems.

6.2 REQUIREMENTS FOR IMPLEMENTING AN INTEGRATED EBT SYSTEM

A broad array of tasks must be accomplished to implement an integrated EBT system. These tasks deal with start-up preparations, start-up activities, and subsequent transition to steady-state operations.

PREPARATIONS FOR EBT SYSTEM START-UP

All participants in an EBT system, except recipients, must be notified, equipped, and trained prior to start-up. At each locus of EBT system activity, the necessary preparations depend on the functions to be performed and the extent to which the necessary resources are in place. The officials responsible for EBT system implementation must ensure that all system participants are prepared to perform their roles in accordance with the final system design.

Management Staff and Trainers. The first group of participants who must be prepared for their role in system implementation and operations are the staff who will manage EBT system operations and train other participants. As discussed in Section 6.1, these may be a mixture of State and contractor staff, depending on the approach to implementation chosen by the State.

All management staff should have a thorough understanding of how the EBT system performs its functions and the roles played by each participant group. Any management staff (including technical and program staff) who have been brought into the project at the implementation stage should receive sufficient training to fulfill their responsibilities effectively. The management staff should finalize assignments of responsibility and procedures for communications among the different units responsible for implementation tasks.

The individuals who will train EBT operations staff and members of participant groups must be selected and trained. These individuals should review training scripts and materials with the developers of those materials, who should highlight key points to be emphasized. The preparatory sessions for trainers should include discussions of typical questions or problems that are likely to arise in training sessions. The trainers should conduct dry runs of training sessions to familiarize themselves with the training scripts, the videos or other training materials, and special equipment (such as POS terminals or EBT workstations) to be used in training.

Data Center Preparations. The necessary preparations for EBT operations at the State data center include:

- final preparation of hardware, software, and telephone lines, including installation of items not already in place for testing and final modifications to resolve problems identified in testing. Any items added or altered after acceptance testing should be tested before live operations begin.

- preparation of the operating environment, including an inventory of critical spare equipment, tape racks, file cabinets, and other necessary facilities that are not already available or need to be supplemented to accommodate EBT operations.

- finalizing procedures for system start-up and operations, and

- assignment and training of staff for EBT operations.

Final procedures for EBT system start-up and operations at the State data center must be established before system operations begin. The procedures should cover:

- daily, weekly, and monthly batch operations;

- file creation and maintenance (including back-up and purging);

- performance monitoring,

- emergency procedures (including restarting the system and notification of key staff at State and local levels); and

- security restrictions (e.g., access to equipment and data, protocols for account adjustments).

The procedures formulated during the development stage may need revisions in light of acceptance testing and final modifications to the EBT system. The implementation team should review the final procedures with the managers responsible for EBT operating units prior to the training of staff and final preparation of manuals. The manuals for all segments of EBT operations at the data center (including computer operations, telecommunications, production control, and reconciliation) should be updated prior to start-up.

The data center must be adequately staffed to operate the EBT system during and after implementation. For the start-up period, a core group of

experienced staff who understand the system's components and functions in depth is needed in each segment of operations. Ideally, these staff should have been involved in development and testing. The availability of such a team is vital to ensuring quick and proper responses to problems during the critical start-up period.

An EBT system intended to function in an integrated setting should be designed for operation by normal staff, so special hiring should not be necessary. However, the implementation team should make sure that enough staff are available to perform all EBT functions as well as the existing responsibilities of the data center. During early operations, the State may want to designate a special "EBT person" on each shift, so that lines of responsibility will be clear.

The training for all data center employees involved with the EBT system should include a general overview of how the system works and how responsibility is distributed among State units and other participants. This introduction should emphasize the importance of the system to recipients and retailers, to offset the natural insulation of data center staff from system users. For each group of staff, the function-specific training should follow the manuals that will be used in operation. Staff should receive hands-on training, or at least orientation to the operation of production equipment, before assuming responsibility. Some staff may receive hands-on exposure during testing; others can "shadow" experienced staff during live operations.

Training for computer operators and supervisors should include details of the system design that involve the functions that they will perform, including interactions with other in-house and external computer systems. The features of any new hardware and related changes (such as operating system modifications) should be noted. All procedures should be reviewed in detail, with special attention to time-critical operations (such as bundle-up), protection of data integrity, and responses to emergencies. The training should anticipate operator short-cuts and common errors, and show how these actions can adversely affect system functioning. If computer operations are split between two groups (i.e., front-end and back-end operations), the training should pay special attention to the requirements for coordination between the groups in normal operations and problem resolution. Staff who do not perform EBT functions but have responsibility for other operations that

interact with the EBT system (such as benefit issuance and reconciliation) should be given an explanation of the interactions and trained in any changes to procedures necessitated by the EBT system.

Training for production control staff must cover a broad range of topics. Depending on the organization of the data center and EBT operations, these staff may be responsible for scheduling and monitoring production, reviewing reconciliation reports and other system output, and collecting and reviewing performance data. The training for scheduling staff should cover the requirements for each daily, weekly, and monthly batch operation. Special attention should be paid to interactions with the clearinghouse institution and other outside parties, including the procedures and deadlines for the transfer of data tapes. The training should also address coordination of EBT functions with issuance, reconciliation, and other State processing functions. Trainees should be given sample output from each job for review, and trainers should point out key fields to check for proper processing. Scheduling staff (or whoever is responsible for performance reporting) should be taught what the performance reports measure, how to interpret them, and what to do if problems appear.

Staff who will be responsible for reconciling the EBT system will need in-depth training. These staff must understand how the system treats all of the possible types of transactions, the flow of funds through the system, and what is required for the system to be in balance. The reconciliation training should point out key indicators on the reports and explain how to diagnose imbalances using the reports and system inquiry functions. Any manual procedures for reconciliation (such as extracting information from several reports to verify that the system is in balance) must be explained thoroughly.

Local Welfare Offices. The preparations for EBT system implementation that must be made at local welfare offices depend on the functions to be performed there. Under nearly any approach to organizing an EBT system, local welfare offices will be responsible for recipient intake procedures, training, and case management. Other local welfare office functions may include hotline coverage, retailer supply, retailer intake and training, and coordination with the FNS Field Office on retailer authorization issues.

Each participating local welfare office must be equipped to perform its designated EBT system functions. Some equipment, such as cameras for photo IDs and workstations, may already be in place before EBT system development begins; other items will be installed (at least at one local welfare office) for acceptance testing purposes. The full array of equipment needed for implementation includes: card production and encoding equipment, training rooms and practice terminals, one or more workstations (with necessary functions in place, if programming is internal), and supplies for card issuance, recipient training, and other EBT functions.

The installation of the necessary equipment may require some site preparation, such as the installation of electrical and telephone lines for the training terminals. Special telephone lines may need to be installed to provide secure voice and data communications to the data center. Space must be set aside for EBT supplies, with secure storage provided for blank benefit cards and other accountable items.

Local welfare office procedures for EBT operations should be fully defined before start-up. EBT operating procedures should be updated to reflect any final system changes, and procedures should be drawn up for other functions affected by the EBT system, such as intake and clerical functions. The implementation team should review all procedures with local office managers and supervisors. Special procedures may be put in place for mass recipient training or other implementation activities. Operating manuals and any special instructions for implementation should be updated on the basis of these discussions; these items should be produced in sufficient volume for initial training and new staff trained after implementation.

Staff must be selected and trained to perform the local office EBT functions. Most of the functions can be performed by existing local office staff, if enough are available, with task-specific training. Local office managers must review the projected EBT workload requirements and assess their impact (and the offsetting reductions in other issuance-related activity) on the overall local office workload. As in the case of the data center, it may be desirable to assign senior staff within each area to perform the EBT functions during start-up.

Training of local office staff to perform recipient service functions should follow the manuals and other documents containing local office

procedures. All local office staff who might be involved with the EBT system should be given an overview that explains how benefits are issued and redeemed, and what role they will play in EBT operations. Trainees who will perform EBT functions should receive hands-on practice in the use of all equipment, including workstations, card production and encoding equipment, and practice terminals used for training.

The selection of staff to cover the hotline and perform other retailer liaison functions should be made with special care. The retailer liaison functions in an EBT system require a combination of public relations skills, training experience, and technical literacy. When PDPW took over operation of the PRC EBT system, the staff selected to cover the hotline and train new retailers were experienced caseworker supervisors. Although these persons had exposure to computer systems through their roles as workers and trainers, they received thorough training to enable them to respond effectively to retailer problems.

The training for retailer liaison staff should provide a comprehensive understanding of how the system operates and how the different parts -- the data center, retailers, the clearinghouse institution, and other participants -- fit together. In addition, they need instruction on how to perform the specific functions of the hotline, including manual sales, trouble-shooting, dispatching service personnel, adding new retailers, and conducting retailer training. The hotline manual, retailer training plans, and retailer manual should be used in these training sessions. Hotline staff at all local offices and at the data center might be trained together to ensure consistency and to facilitate coordination between shifts.

Other Field Sites. The EBT system may utilize other field sites in addition to local welfare offices. Store equipment servicing, for instance, may be done at a separate site. This site may be a contractor's existing office or a new site established for EBT store equipment installation and maintenance, such as the EBT Center Annex that PRC established. In addition, this service site may be used for storage and distribution of retailer supplies. In some cases, the hotline and other retailer liaison functions may be performed by the service contractor or some other contractor. Preparations required for such additional field sites include: securing space, installing necessary equipment and phone service not already in place, and stocking supplies (spare parts, printer paper and ribbons, etc.).

The retailer equipment service technicians must be selected and trained early in the implementation phase; they will be needed for the important task of installing retailer equipment. The implementation team must finalize procedures for this function (after consultation with the technicians' supervisors) and produce a handbook or guide for retailer service staff. The training for retailer service personnel should include background on the retail food store environment (such as the impact of malfunctioning equipment on all shoppers and store profitability) and on the general EBT system design. Technicians should receive thorough training in installing and servicing the terminals and printers that will be used in the EBT system.

Retailer Preparation. Retailers must be equipped, trained, and their accounts recorded on EBT system files before they can process purchases. These tasks represent a large amount of the overall start-up effort. The terminals, printers, and mounting hardware must be ordered during the development phase, so they will be ready for installation following successful acceptance testing. If additional telephone lines or extensions are needed, the telephone company must install them before the store equipment can be set up. Depending on the arrangements established with retailers, arranging telephone line installations may be the responsibility of the equipment installers or the retailers. If retailers are responsible for EBT phone line installation, scheduling equipment installation may be more complicated and require a longer period. The installers or the retailers may also need to arrange installation of electrical circuits for the POS equipment.

The scheduling of retailer equipment installations must be coordinated with the retailer recruiting process and with the FNS Field Office. Retailer agreements to participate may continue to arrive during the acceptance testing and implementation stages. The FSP authorization of these new applicants must be confirmed by the FNS Field Office, and a site survey must be conducted for each newly eligible store. The State should also confirm the authorization of previously enrolled stores with the FNS Field Office before scheduling equipment installations, in case any store's authorization has been terminated.

Once the store's FNS authorization has been verified and telephone and electrical service for the terminals is in place, a terminal and printer

must be installed at each checkout counter where EBT purchases will take place. When PRC installed the store equipment in Reading, this process took between two and four hours per counter, depending on the availability of electrical lines and the terminal mounting requirements. Terminal installation may be complicated by changes in the store configuration since the site survey. Equipping stores may also include installation of balance inquiry devices. All store equipment should be tested before installation is considered complete.

Several subsidiary tasks must be performed to complete each store installation. The store owner or manager must complete forms to accept responsibility for the equipment and other terms of participation. Bank account information and authorization for ACH transfers also must be provided. The store must be stocked with supplies needed for EBT participation, such as manual sale slips, printer paper, and ribbons.

Depending on system design, the State may need to issue magnetic-stripe cards or other devices to allow retailers to sign terminals onto the system and perform other restricted functions (e.g., refunds). This card may have to be created in advance by retailer liaison personnel; if the retailer is to select the PIN, additional coordination before installation will be required. The store card could, instead, be issued at the time of retailer training. The State may choose to issue a back-up card to each retailer (as PDPW did), so that EBT operations at the store can continue if one card is damaged or unavailable.

The State needs to set up an EBT system account for each participating retailer. The forms signed by the owner or manager during installation should provide the necessary data for this account, including the owner or manager's name, store address and telephone numbers (including lines installed for EBT terminals), FNS authorization number, and bank account data. Identification codes for terminal and clerks also must be entered on the EBT system. EBT staff must make sure that the ACH transfer authorization forms are submitted well in advance of the start-up date and are properly processed, so that transfers will be routed correctly.

Prior to the commencement of retailer training, the trainers should verify that the retailer manual is complete and up-to-date. The manual should cover all of the topics for retailer training, including: an overview of EBT

system operations, instructions for equipment use, trouble-shooting, back-up purchase procedures, responses to recipient problems, and reconciliation and settlement information for managers. A quick-reference guide to checkout counter operations, such as the "BTT User Guide" produced by PRC, is a desirable tool for training. Trainers should make sure that adequate quantities of retailer manuals and other training materials are available for the initial mass training and for training of new retailers added during operations.

Training should be scheduled at times that are convenient to retailers, within the limitations of the implementation schedule. Training should be conducted during off-peak hours, and should not be scheduled when retailers would have to pay overtime to participating staff. Holiday periods and other busy times of year should be avoided.

Other requirements for retailer training will depend on whether retailers will be trained in groups at a central location or individually in their own stores. Central training (the approach used by PRC) permits the training of large numbers in a short period with few trainers. Retailers can be trained under this approach before their own equipment is installed.

Central training requires a site that is accessible to retailers

If training is performed at a central location, some of the benefits of in-store training can be achieved by having installers do a quick follow-up, demonstrating the terminal and printer operations and walking employees through their functions. This approach would address the problem experienced by PRC: most stores sent only managers or selected clerks to PRC's group training. As a result, many clerks received their EBT training from their supervisors, who did not have sufficient knowledge and equipment to provide thorough, realistic instruction.

Bank Preparations. The implementation team must make sure that the clearinghouse institution and the Federal Reserve are prepared to fulfill their roles in the EBT system. The clearinghouse institution should be kept up-to-date on progress in system development and notified once the EBT system has been accepted and the start-up date has been set. The State and the participating institutions should review and finalize the operating procedures for the ACH interface, including: deadlines, the format for the retailer credit file and other data transfers, bank reimbursement by USDA for funds transferred, and resolution of problems with transfers. While the clearinghouse institution should have the necessary staff and facilities in place, the implementation team should verify that any changes necessary for EBT operations have been made before the start-up date. Any special procedures involving the Federal Reserve should be confirmed with the appropriate officials. All ACH prenotification forms for retailer accounts should be submitted early enough to avoid delays in crediting retailers once operations begin.

Retailers' banks should be notified of the start-up date and informed of appropriate contacts at the State Agency to resolve any problems during start-up. This notification should be a follow-up to earlier contacts during the design and development stages to secure the banks' cooperation and make sure they are linked to the ACH. It may be desirable to confirm retailer account information through the banks to prevent transfer problems.

Other Notification. State staff responsible for coupon management should be notified of the EBT system start-up date, so that they adjust their orders for expected changes in coupon demand in the pilot area. These staff should already be aware of the plans for the EBT system, especially if the fall-back plans require special action on their part. Issuance agents or other coupon delivery contractors also should be notified of the start-up date and prepared to perform their roles in the fall-back plan.

EBT SYSTEM START-UP ACTIVITIES

System startup activities include:

- loading the production data base,
- notifying recipients,
- training recipients,
- providing assistance to participants during start-up, and
- monitoring initial operations.

Loading the Production Data Base. The first step in starting up EBT system operations is the loading of the initial production data base. The security file and other control files created during development and testing should be updated to include all production staff. Retailer and terminal data should be accumulated during the retailer preparation process, but they should be printed out and checked before transaction processing begins. History and reconciliation files need to be initialized for live operations.

The most critical task in loading the production data base is transferring the recipient account data from the Master File and posting benefits for the first month's trainees. This task will introduce value into the EBT system and create the first transaction records. The account data should be error-free to prevent problems during issuance and training. The first benefit posting should occur long enough before the first training session so that any problems during posting will not cause training delays.

Recipient Notification. All recipients should be informed of the planned start-up date and the changes that the EBT system will bring to them. This notification should include not only a formal notice mailed to each recipient, but also extensive publicity in the local media, including print, radio, and television. Notification should begin with general information during the design phase and become more detailed as the start-up date approaches. Prior to the start-up of the PRC system, PRC and PDPW representatives appeared on the local community-access cable channel to explain the demonstration, and PRC prepared a brief, narrated slide show that was shown

repeatedly on the same channel. USDA and Commonwealth of Pennsylvania officials held an inaugural ceremony shortly before the demonstration start-up date.

Recipient Training. Once recipient accounts have been set up and benefits posted, recipient training can begin. The requirements for recipient training include: scheduling, issuing transaction cards, providing recipients with handbooks and other training materials, conducting training sessions, and taking action in cases when the recipient fails to appear for training. Local welfare offices should have all staff, equipment, plans, and materials for recipient training ready before start-up.

The scheduling of recipients for training must accommodate program requirements and the capacity of the training staff and facilities. Program regulations require that recipients receive each regular monthly issuance within 35 days of their last regular issuance. Depending on the issuance schedule for the project area, this requirement could restrict the allowable training period to as little as one week or as much as three weeks a month. The number of recipients who can be trained during this "window of opportunity" will depend on the amount of training space, staff resources, and the number of sessions that can be conducted each day.

Each month's training group must be selected and notified well in advance of the training sessions. Selection may require the assistance of the data center to generate lists of recipients according to desired scheduling criteria (e.g., if certain groups are targeted for special training). The cooperation of the data center also will be needed to ensure that the recipients selected for training will have benefits posted to the EBT system, instead of receiving their issuances in the regular manner.

Once the list of trainees for the month is drawn up, they must be scheduled for specific training sessions. In Reading, recipients received notice of when they were scheduled for training two weeks in advance. The scheduling procedure may have to provide some flexibility for working recipients or others for whom attending the assigned session would be a hardship. If benefit cards have been issued in advance, the notice should remind recipients to bring their cards to training. The schedules should also provide make-up training sessions for those who are unable to attend their scheduled training.

The recipient training sessions should be organized around the material in the recipient handbook. The lesson plan devised by PRC, a useful guide for other EBT projects, included the following topics:

- the purpose of the training session and the rationale for the demonstration;
- the functions of the benefit card and the PIN, PIN selection, and the importance of keeping the PIN secret;
- how to shop with the benefit card (emphasizing the instructions in the handbook);
- where recipients can shop (using a retailer roster handed out to the recipients);
- taking care of the card to prevent loss or damage (coordinated with the handing out of encoded cards and protective wallets);
- use of the alternate shopper card;
- the manual purchase procedure;
- how to track and check the account balance;
- dealing with problems with the card, issuance, or transactions;
- practice with encoded cards and sample store equipment;
- a review of the key points of training, with emphasis on the need to know the balance before shopping, the absence of cash change, and the availability of the manual sale procedure.

Recipients also were given a special flyer for children and taught to train children and other household members who might use the system when shopping. Each training session lasted an hour, including 15 to 20 minutes of practice. Each session required a lead trainer, a clerk to collect the cards and PIN selections (which recipients wrote on a slip of paper attached to the card), and another clerk to encode the cards; a total of four staff assisted recipients during the practice sessions. Between 15 and 30 recipients were scheduled for each session, depending upon which of two training rooms was being used.

Depending on the composition of the recipient population, the training may have to be adapted in a variety of ways to meet special needs.

Those recipients expected to have more difficulty in learning to use the EBT system (including elderly, non-English speaking, and disabled recipients) should be placed in smaller groups where they can receive more attention. It may be desirable to delay training of these groups (as PDPW did during PRC system implementation), so that system operations will be more stable when they begin to make purchases. If a sizable non-English speaking population must be trained, the recipient handbook and other materials should be translated, and bilingual trainers should be used. Trainers may need to help some recipients in selecting a PIN that they can remember, such as one that follows a simple pattern. In Reading, members of client advocacy groups were trained to serve as authorized representatives for recipients who were likely to have difficulty with the EBT system.

The scheduling of recipients for training should include newly certified recipients, so that they do not have to make the transition from coupon use to EBT purchases. Some exceptions to this rule may be necessary, however. Recipients who qualify for expedited issuances may not be able to fit into the training schedule in time; in these cases, the initial issuance will have to be made using the pre-existing system. Newly certified recipients who need special training may have to be issued coupons until a slot in an appropriate session is available.

Local welfare office staff will have to follow up on recipients who fail to appear for training. In Reading, no-shows were scheduled for make-up sessions. About 9 percent of all recipients failed to appear for regularly scheduled training and make-up sessions. These recipients' cases were closed after standard notification procedures. (About half of these cases, however, would have been closed for other reasons.) The benefits posted to their accounts for the month of training were removed from the EBT system through the coupon conversion function, under the justification that the recipients had failed to meet the certification requirements for that month.

Assistance to Retailers and Recipients During Start-up. Even the best retailer and recipient training will not prevent some problems from arising during start-up operations. The State or its contractors should provide additional assistance to retailers and recipients during this critical period, so that minor misunderstandings and mechanical problems do not undermine confidence in the EBT system.

Assistance to retailers and recipients during start-up could take any of several forms. One approach is to provide extra hotline staff to make sure that retailer and recipient calls for help are handled promptly and effectively. These extra staff could include store equipment experts, software specialists, and welfare agency staff. Other recipient services, such as card replacement, should be generously staffed to ensure prompt response to problems.

A team of specially trained facilitators could visit participating stores to observe operations and respond to problems. In high-volume stores, it might even be desirable to station facilitators on-site during peak shopping periods. The field facilitators should be well trained in all retailer and recipient procedures, and they should be able to trouble-shoot and fix minor equipment problems (such as loose terminal connections or changing printer paper). During start-up in Reading, a team of 20 staff from the FNS Regional and Field Offices answered telephone calls at the EBT Center and visited stores to provide on-site assistance. In the absence of such special facilitators, the staffing of the retailer equipment maintenance operations should be enhanced during start-up.

Another potential source of assistance is volunteers from community agencies. Prior to system start-up in Reading, PRC and PDPW staff met with volunteers from a number of different community agencies and explained system operations and how recipients would use the system to buy groceries. These volunteers were then prepared to assist recipients who were having problems with the system, both during start-up and later periods of operations.

Monitoring Operations During Start-up and Phase-in. The managers and staff responsible for EBT system operations should monitor the system particularly closely during the start-up and phase-in period. The operation of the EBT system during this period serves as the final test of the system's ability to perform its intended functions in accordance with the standards set out in the design documents. Careful monitoring is needed to detect emerging problems so they can be resolved before they become critical.

The activities of all participant groups and the problems they encounter should be monitored. A summary of important activity patterns and potential problems is presented below.

- Retailer operations: sales volume; transaction times; busy signals encountered by terminals; communications errors; equipment reliability; clerk errors; and ability to reconcile sales.

- Recipient use: purchases by household; purchase size; benefit exhaustion; PIN errors; purchases rejected for insufficient balance; confusion about issuance; resolving problems with purchases; functioning and use of balance inquiry devices; and lost, stolen, or damaged cards.

- System operations: up-time; maintenance of operations schedules; operator errors; capacity utilization; reconciliation discrepancies; and coordination with other operations.

- Local welfare office operations: maintenance of training schedules; workstation response times and reliability; card encoding equipment performance; ability to respond to recipient problems; and impact on workload.

- Other institutions: accurate funds transfers; communications with Field Office on new retailers and removals; and coordination with FNS reconciliation and redemption monitoring.

One useful monitoring tool is the system's reconciliation reports, which should be examined closely during start-up. If any apparent discrepancies are detected, they should be investigated throughly, to determine whether they are real discrepancies (caused by processing errors or tampering) or flaws in the reports themselves. Any such flaws should be immediately remedied. The reconciliation reports should also be used to monitor the rate of flow of funds through the system. More rapid outflow of funds than expected may indicate a need to increase the funding of the account for reimbursing the clearinghouse institution. Conversely, accumulation of funds in the EBT system may present an attractive target for tampering.

EBT activity reports should be used to compare activity levels, such as overall transaction rates and peak loads, to design assumptions. The reports should be designed to highlight differences between expected and actual activity levels, and to facilitate analysis of trends in activity and their implications for system operating performance. If the reports show substantial differences between critical design assumptions and actual system use, the implementation team should consider what problems might result and

how they should be addressed. Activity reports will also provide useful data for planning future expansion of the system.

A well-designed performance reporting system is vital to the effective monitoring of EBT operations during start-up. The implementation team should monitor the effects of activity levels on processing times, capacity utilization, and other performance indicators as the caseload is phased in. If performance deteriorates significantly, further recipient phase-in may have to be delayed to permit corrective action, as was the case in Reading. The reliability of all system components should be closely watched to identify any design or manufacturing defects that were not discovered in the testing environment.

Other management reports will be useful in identifying the frequency of problems experienced by recipients, retailers, and other participants. These reports should cross-tabulate problems by explanatory/targeting variables, such as retailer type or ID, recipient language, etc.. Unusual or disturbing patterns should be interpreted with care, because they may be the result of misleading or ambiguous reports rather than actual problems. For example, the PRC system labeled refunds issued by grocers as "system overrides", combining them in the same category as transactions reversed by the EBT system due to a lack of a confirmation message from the terminal. Thus, it was never clear how much this statistic reflected returns and other situations requiring refunds, and how much it was an indicator of problems in completing transactions.

Logs maintained by the hotline and system operators also can be useful in tracking the incidence of EBT system problems. These logs should be set up to facilitate analysis. At a minimum, they should be organized to permit quick review. If possible, logs should be maintained on a structured database system, such as the computerized logs developed by PDPW to coordinate the separate hotline sites in Reading and Harrisburg.

EBT system managers should conduct on-site observation of system operations to supplement the review and analysis of EBT system reports. These observations should include participating stores, welfare offices, the computer center, hotline sites, the reconciliation site, the retailer equipment service facility, and the clearinghouse institution. The observers should compare actual operations with the procedures established and, where

appropriate, collect performance data. They should also seek feedback on how the system is functioning from the perspectives of retailers, recipients, and operational staff.

The apparatus for monitoring EBT system operations will not lead to any improvements without an effective mechanism for synthesizing the data and responding to problems. While the EBT operations staff should take the lead in this activity, other individuals involved in the system's design and development should be available to lend their expertise. Top management officials in the cognizant State departments and FNS officials should be kept informed of the general progress of implementation and any major developments that may require their attention. To maintain communication among the interested parties, the implementation team should prepare periodic progress reports discussing highlights of system activity and issues that have arisen. Periodic meetings of key personnel may be needed to provide a forum for monitoring implementation and making necessary decisions.

TRANSITION TO STEADY-STATE OPERATIONS

An EBT system can be said to have reached steady-state operations once the following conditions exist:

- all implementation tasks have been completed;
- all system functions are fully operational;
- system performance is consistently meeting or exceeding performance standards; and
- users are interacting satisfactorily with the system.

Depending on the State's approach, completion of the final implementation process may require a transition of control from the implementation team to the normal production management structure. In the case of a turn-key project, this transition may be an extensive process involving staff training as well as a change of leadership. Where State staff have managed implementation, the main change will be a shift of management and operational functions from relatively senior staff to mid-level managers and less experienced operational personnel.

Once an EBT system has operated long enough at steady-state in the pilot area, the State can begin evaluating the results of pilot operations.

This evaluation should be guided by criteria established in the design stage, such as objectives for performance, cost, security, ease of use, and participant satisfaction. The State should seek input from system users on improvements that may be desirable before the system is expanded. The expected costs of improvements and expansion should be weighed against the potential savings and other likely benefits of expansion.

In addition to the State's own evaluation, the desirability and feasibility of expanding the EBT system to the full service area identified in the system design will depend on current legislation, FNS regulations and administrative policy toward EBT systems, and trends in the Food Stamp Program environment, such as pressure from retailers to eliminate coupons or increased losses from paper-based issuance systems. The availability of State and FNS resources for expansion also will be a factor. At present, EBT systems are only permissible under FNS-approved demonstrations, and FNS must approve expansion beyond the pilot area. The results of the current State-initiated EBT demonstrations will be critical in determining whether FNS, Congress, and other key parties will support permanent, large-scale EBT systems.

Appendix A

CONCEPTUAL TIMELINE FOR EBT SYSTEM DESIGN, DEVELOPMENT, TESTING, AND IMPLEMENTATION

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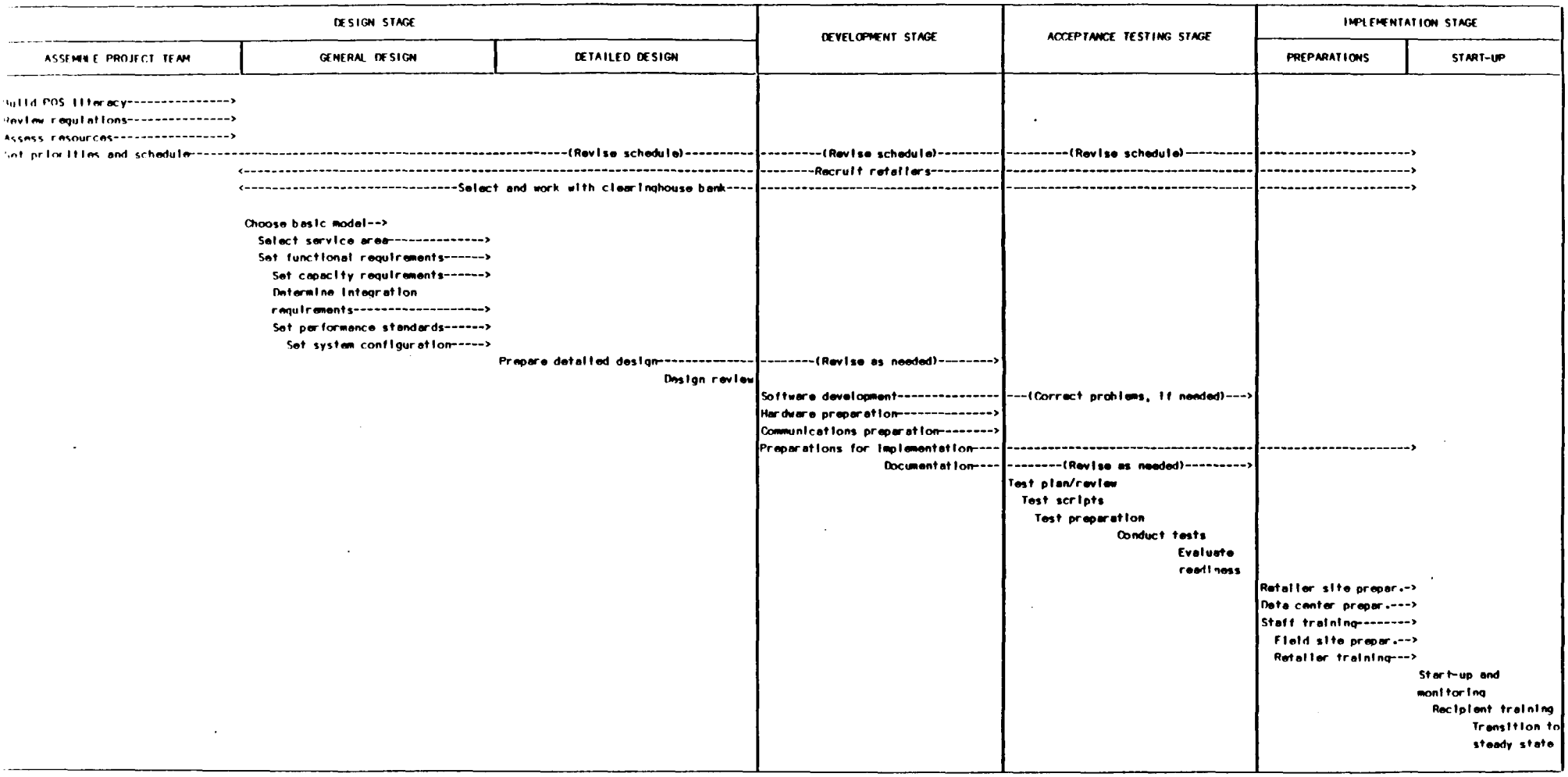
CONCEPTUAL TIMELINE FOR EBT SYSTEM DESIGN, DEVELOPMENT, TESTING, AND IMPLEMENTATION



NOTE: Relative length of item on timeline is not intended to correspond with duration of task.

Appendix B

EXAMPLE OF PDPW EBT ACCEPTANCE TEST SCRIPT

4.2 DISTRIBUTION OF BENEFITS TO (CLIENT) ACCOUNTS.

In this section the distribution of regular and supplemental benefits to client dummy accounts will be completed. The section is intended to be the same as its corresponding section in the acceptance test of the original EBT system. However, in the original acceptance test this section included both client accounts and merchant account set-up. The six merchant accounts have already been established in the initial values section (Section 3.3), so the merchant set-up will not be included in this section.

The initial values for 10 of the client accounts and their corresponding PIN and BIC issuance procedures were completed in Section 3.4 of this document. A regular issuance for each of the original 10 clients will now be performed, and a supplemental issuance for five new clients will also be performed. The detail data for each record are contained in Exhibit 4.1.

The PIN and BIC issuance procedures for the 5 supplemental accounts correspond to the original acceptance test "Issuance of Benefit ID Card" (Step 3) and will be completed in Section 4.3 of the preliminary test.

There are five sub-sections in this portion of the CAT. The first sub-section is the background or purpose of this section. The next four sections are the procedures, resource requirements, procedural steps and expected results.

4.2.1 Distribution of Benefits to (Client) Accounts - Background.

In Section 3.4 the initial values for the the first 10 clients were set according to the information in Table I - 4. The transmission of the data via tape was balanced and revieved using the Client Authorization File workstation screen. In this section these first 10 clients will have their existing balances updated using the information from Exhibit 4.1. In addition, five new

clients will receive supplemental benefits on this issuance tape to be sent from the PDPW mainframe processor. The 15 clients to be used for this testing correspond to the 15 clients used during the original system acceptance test. These clients will receive multiple issuances during the course of the new function test (Section 5).

Client record preparation on the PDPW system and transmission to CEBTS are expected to be performed in a manner similar to the procedure performed under the current system. However, the PDPW mainframe system's benefits processing is not required to produce client records and in some cases the mainframe benefits system will be unable to create the conditions required for testing purposes. A special program to create records and produce tapes may be used, as long as proper balancing controls between the "PDPW" tape and Tandem tape processing can be maintained. The transmission of the client records will be reconciled in the usual manner. The reconciliation step is included as part of the procedures for this section.

4.2.2 Distribution of Benefits to Accounts - Procedures.

In this section the Test Supervisor will enter the client record information tape from the PDPW mainframe systems or the client record creation program in the CEBTS Tandem processor. The Tandem computer operator mounts the tape and executes the following Tandem commands:

```
:VOLUME &DATA.EBTO
:OBEY LOADTAPE
```

Upon executing the batch processing program (Client Account Update - Section 5.1 EBT Operations Manual for the Tandem processor) an end-of-job balancing report will be produced. The expected values for the report are included in Exhibit 4.2 of this section.

The five supplemental issuance clients added to the file during this section will require the establishment of a BIC and of a PIN. This procedure will be completed in Section 4.3, when the tape issuance balancing has been completed. The BCAO Test Representative will be responsible for creating the BIC and the PIN OFFSET for entry into the appropriate files. The detail procedures are noted in Section 4.3.3.

The values for the client records are provided in Exhibit 4.1. The Acceptance Testing Representative should compare each test client's values in the exhibit against the values shown on the CAF1 & CAF2 workstation screens, using the expected results procedures in Section 4.2.4.

Missing data or inaccurate data should be noted on the Test Discrepency Form (TDF) and with the Acceptance Test Supervisor, who will note them in the Test Discrepency Log (TDL). At the time of logging a correction priority will

4.2.3 Distribution of Benefits to Accounts - Resource Requirements.

The resources required under this section are limited to staffing, data, tape transmission between the Tandem and Sperry systems, and the screens required to support this effort. Hardware requirements, such as CRT terminals and computer components, and application software requirements, such as the CEBTS, are assumed to be available, as required.

Staff Required: 1 - Acceptance Testing Supervisor.
1 - Acceptance Testing Representative.
1 - BCAO Test Representative.

Data Required: Exhibit 4.1 - First Update Values for Client File.
Exhibit 4.2 - Client Control File Balancing - 2nd Upd.

Workstations Screens Reqd: Client Authorization File Screen 1 (CAF1).
Client Authorization File Screen 2 (CAF2).

Hardware: None.

Materials: Normal Requirements.

Time Required: .5 hour.

4.2.4 Distribution of Benefits to Accounts - Procedural Steps.

The following steps are to be completed for distributing benefits to accounts. The Test Representative along with the BCAO Test Representative will be responsible for executing these steps.

Step No	WorkStation Screen	Procedure to be followed.	Data to be entered
1	Client Record Creation	Test Supervisor is to have client records created using Exhibit 4.1 data.	Exhibit 4.1
2	Load Client Records to CEBTS	Test representative is to load client records tape onto CEBTS. The first 10 regular and 5 supplemental issuance records will be on tape.	Section 5.1 Clnt Acct Upd EBTS OPS Man
3	Reconcile Records sent to CEBTS	Test Representative to reconcile tape records using normal procedure	Exhibit 4.2

4.2.5 Distribution of Benefits to Accounts - Expected Results

Upon completing entry of all client file data, the Test Supervisor will review the data for each client entry. To ensure positive verification of data entry, the Test Representative will print copies of each screen and compare each data element on the copy with the corresponding data element in Exhibit 4.2. Noted below are the detailed steps to be followed to complete the data review.

Step No	WorkStation Screen	Procedure to be followed.	Data to be entered
1	EBTS LOGON	- Enter Employee Number (Case No) •• Sign-on as SUPR •• - Enter Password: - Press the Enter Key Successful sign-on goes to main menu.	1111111 1111111 Enter
2	MAIN MENU	- Press function key #5 Operator moves to the Control File Maint Menu	F5
3	CONTROL FILE MAINT	- Press function key #3 - Key Client Case NBR Operator moves to the Client Autho File Maint Screen 1	F3 1110001
4	CLIENT AUTH FILE MAINT (CAF1)	- Review the appropriate data for the Client Auth File Maint Screen 1 (Exhibit 4.1). <1> - Press function key #9 This causes operator to go to Client Auth File Maint Screen 2	 F9
5	CLIENT AUTH FILE MAINT (CAF2)	- Review the appropriate data for the Client Auth File Maint Screen 2 (Exhibit 4.1). <1>	
6	CONTROL FILE MAINT MENU	- Press Shift Function Key #12 Repeat steps 3 - 6 until Client Auth File information has been completely verified. ••• Note: enter the next Case Number in Exhibit 4.1.	SF12

<1> Using a copy of Exhibit 4.1 review the data elements on the file and note on a Test Discrepancy Form (TDF) any missing or inaccurate data elements.

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Exhibit 4.1

First Update Values for Client Control File

Regular Issuance Values
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Field Name	Client A	VER	Client B	VER	Client C	VER
Case No	1110001		1110002		1110003	
Name	Audrey Alfa		Blanch Baker		Chas Charlie	
Monthly Iss	$ 50		$ 60		$ 65	
Suplmtl Iss	$ 0		$ 0		$ 0	
File Balance	$ 70		$ 60		$ 80	

Field Name	Client D	VER	Client E	VER	Client F	
Case No	1110004		1110005		1110006	
Name	Daffy Delta		Ernest Echo		Fanny Foxtrot	
Monthly Iss	$ 70		$ 70		$ 60	
Suplmtl Iss	$ 0		$ 0		$ 0	
File Balance	$ 70		$ 70		$ 70	

Field Name	Client G	VER	Client H	VER	Client I	VER
Case No	1110007		1110008		1110009	
Name	Gerry Golf		Harry Hotel		Inez India	
Monthly Iss	$ 50		$ 70		$ 85	
Suplmtl Iss	$ 0		$ 0		$ 0	
File Balance	$ 70		$ 70		$100	

Field Name	Client J	VER
Case No	1110010	
Name	Jean Juliet	
Monthly Iss	$ 50	
Suplmtl Iss	$ 0	
File Balance	$ 50	

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Exhibit 4.1

First Update Values for Client Control File

Supplemental Issuance Values
Page 2 of 2

Field Name	Client K	VER	Client L	VER	Client M	VER
Client BIC	_____		_____		_____	
Case No	1110011		1110012		1110013	
PIN Value	KKKK		LLLL		MMMM	
PIN Offset	_____		_____		_____	
Name	Kinsy Kilo		Lexis Lexicon		Mary Maxwell	
Address	111 Krees Wy		112 Larry St		113 Munsy Ln	
City	Kilroy		Lima		Monroe	
State	PA		PA		PA	
ZIP	11000-1100		12000-1200		13000-1300	
Account Sta	A (Active)		A (Active)		A (Active)	
Account Typ	9 (New)		9 (New)		9 (New)	
Language	E (English)		E (English)		E (English)	
Monthly Iss	$ 0		$ 0		$ 0	
Suplmtl Iss	$ 50		$ 70		$ 60	

Field Name	Client N	VER	Client O	VER
Client BIC	_____		_____	
Case No	1110014		1110015	
PIN Value	NNNN		0000	
PIN Offset	_____		_____	
Name	Nelly Nasty		Olie O'Connor	
Address	114 Nerd Ct		115 Ostrich	
City	Nasturtium		Oslo	
State	PA		PA	
ZIP	14000-1400		15000-1500	
Account Sta	A (Active)		A (Active)	
Account Typ	9 (New)		9 (New)	
Language	E (English)		E (English)	
Monthly Iss	$ 0		$ 0	
Suplmtl Iss	$ 40		$ 80	

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Exhibit 4.2

Client Control File Balancing

Second Client File Update

This is the END OF JOB REPORT format as it should appear.

Trailer Record - Total Regular Issuance Records: 10

Trailer Record - Total Regular Issuance Coupons: $ 620

Trailer Record - Total Supplemental Issuance Records: 5

Trailer Record - Total Supplemental Issuance Coupons:$ 300

Regular Issuance Amounts Agree: Successful Completion

Regular Issuance Record Counts Agree

Supplemental Issuance Amounts Agree: Successful Completion

Supplemental Issuance Record Counts Agree

Statistics For This Job

This Batch Job Sequence #:	_____
Total Header Records Found:	2
Total Detail Records Found:	15
Total Trailer Records Found:	2
Total Input Records Found:	19
Total Updates to Client File:	15
Total Amount of Update Client Dollars:	$ 620
Total New Clients Added to Client File:	5
Total Amount of New Client Dollars:	$ 300
Total Amount of This Batch in Dollars:	$ 920

The Processing For This Job Began At: Date: __/__/__ Time: __:__:__

The Processing For This Job Finished: Date: __/__/__ Time: __:__:__